This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

600052054M

56 +

Hydraulic Presses, &c.

COMPILED BY E. HOWARD.

Hayward Tyler & Co., London.

1866

"RIDER'S PATENT HOT AIR ENGINE,"

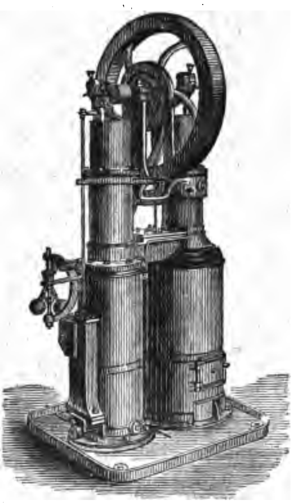
FOR PUMPING AND DRIVING SMALL MACHINERY.

Possesses the advantages of ***Absolute Safety, Simplicity,*** and ***Economy*** (costing under ½d. per horse power per hour).

SOLE MAKERS, HAYWARD TYLER & Co., ENGINEERS, LONDON.

Awarded SILVER MEDAL of the Royal Agricultural Society, Birmingham Meeting, 1876.

Awarded Silver Medal at the Kidderminster Agricultural Show, 1877.



Awarded the Highest Prize at the Centennial Exhibition, Philadelphia, 1876.

Highly Commended at the various Shows where it was not eligible to compete for prizes.

THE FOLLOWING ARE SELECTED FROM A GREAT NUMBER OF PRESS NOTICES AND TESTIMONIALS OF THE ENGINE:—

In this new Caloric Engine ("Rider" Compression Engine) the difficulties encountered by many eminent inventors are successfully overcome. The working parts show the utmost simplicity of arrangement, and for a small power the consumption of coal is not heavy.—*Times.*

Simple, straightforward, and easily managed by untrained hands.—*Engineering.*

Its construction is of the simplest kind, and no skilled labour is requisite to work it, a few simple directions being all that is required—*Chamber of Agriculture Journal.*

The engine exhibited at work (6 inch) with about 25 to 30 lbs. of coke in the fire box, slightly replenished about once in every hour, was delivering water to a tank about 35 to 40 feet high. This is excellent work for a Hot Air Engine of the size, and at so small a fuel-consumption as 18 to 20 lbs. of coke in the day of eight to ten hours.—*Iron.*

Especially applicable to the supply of gentlemen's mansions, hotels, and public buildings.—*Iron Trade Exchange.*

Re ½ H.P. Hot Air Engine, Pumping.

MESSRS. HAYWARD TYLER & Co. Ewell, Surrey, June 13th, 1877.

Gentlemen,—The "Rider" Hot Air Engine you supplied some months since is working very satisfactorily. The cost of fuel is very trifling. The only attention it has had has been that of the gardener's boy, 16 years of age. I consider it the most economical pumping power I have ever seen. I should be pleased to show it to anyone you may send to see it.

Yours truly, *(Signed)* WM. KILLICK.

Re 1 H.P. Hot Air Engine, Working Mortar Mixer.

Alnwick Castle, Northumberland, Estates Office, June 12th, 1877.

MESSRS. HAYWARD TYLER & Co., LONDON.

Gentlemen,—The 1 H.P. Hot Air Engine supplied by you has been used for working a mortar mixer, and is still doing so, and I am glad to inform you that it is doing the work well.

Yours, &c., *(Signed)* G. REAVELL.

Re ½ H.P. Hot Air Engine, Pumping.

MESSRS. HAYWARD TYLER & Co., LONDON. The Elms, Hereford, June 4th, 1877.

Gentlemen,—It gives me much pleasure to state that the Hot Air Engine supplied to me by you affords me entire satisfaction. It works well and easily, and the entire water supply at my house is pumped up several hundred yards by means of this Hot Air Engine.

Faithfully yours, *(Signed)* CHARLES ANTHONY.

Re 1 H.P. Hot Air Engine, driving Printing Machinery,

MESSRS. HAYWARD TYLER & Co., LONDON. Bergen, Norway, May 1st, 1877.

Gentlemen,—The Engine has worked steadily in the Printing Office of the "Bergen Times newspaper, driving 1 double-demy printing press, and at that making 96 to 100 revolutions per minute. The proprietor speaks now of buying another ½ H.P. Engine, as for his purpose they are very economical, serving as well for a heating stove as for a Motor.

Yours &c., THOS. M. WILSON.

NOTES FOR USERS

OF

HYDRAULIC PRESSES

AND OTHER

Hydraulic Machinery.

ILLUSTRATED WITH ENGRAVINGS AND COPIOUS TABLES.

COMPILED BY E. HOWARD,

OF THE FIRM OF

HAYWARD TYLER & Co.,

HYDRAULIC ENGINEERS,

UPPER WHITECROSS STREET, LONDON. E.C.

PUBLISHED BY
HAYWARD TYLER & Co., LONDON.

1877.

CAUTION.

All the Engravings and Tables in this Work are Copyright, and any person copying or making an improper use of the same will be liable to legal proceedings.

BIBLIOTHECA·BODLEIANA

NOTES ON

HYDRAULIC MACHINERY.

Hydraulic Presses, Hydraulic Lifts, Hydraulic Jacks, and numberless other machines of the same class, though differing widely in outward design and in almost every detail of their arrangement, act on the same principle and obtain the required results in the same way. It appears therefore desirable, before describing the forms of hydraulic machines most generally in demand, to explain briefly the principle on which they act, and to define the technical names for various parts which are used in the following catalogue.

PRINCIPLE OF THE HYDRAULIC PRESS.

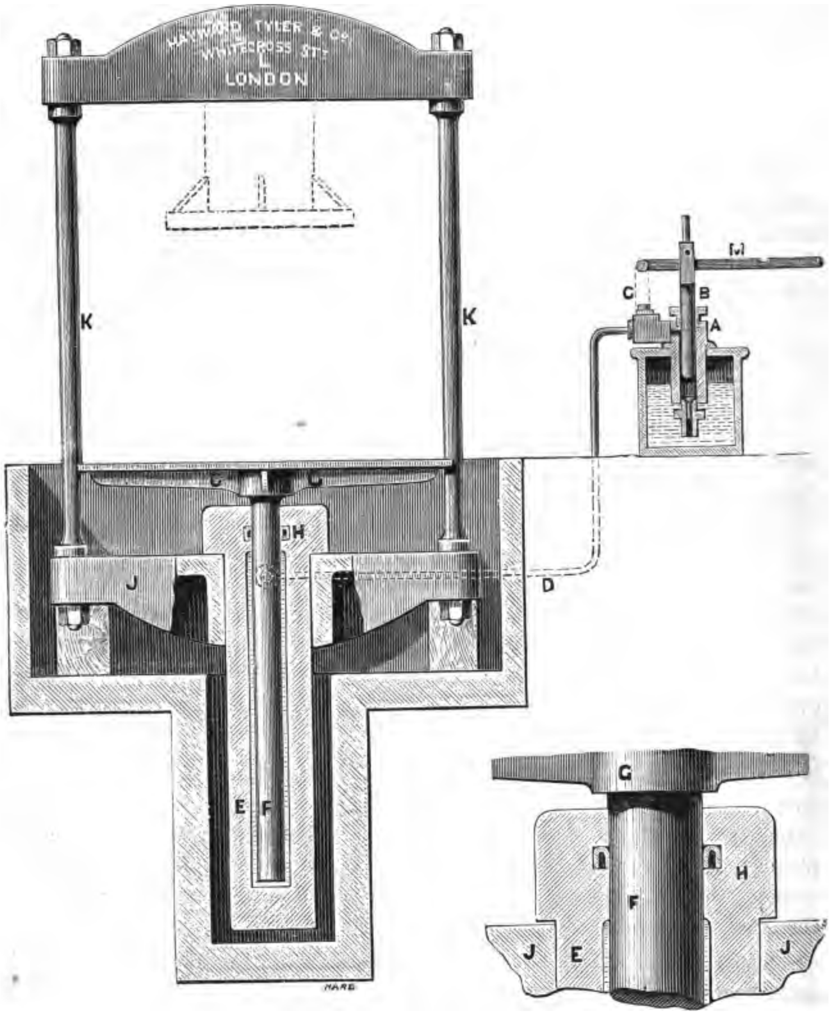
The action of all forms of the hydraulic press depends on the property possessed by non-compressible fluids (such as water) of communicating pressure from one part of their body to another, in all directions. Thus if we have a body of water shut into a vessel of any shape, or in several vessels communicating with each other, and if we can apply a pressure to the surface of any one part of this body of water, the same pressure is communicated to every part of the surface of the whole body; say, for instance, that a pressure of one ton can be applied to one particular square inch of the surface, the water being shut in, and not able to escape or to diminish in volume, will press outwards with a force of one ton on every other square inch of the surface. This property of water was discovered by Pascal.

Now, if we have two cylinders of unequal size in communication with one another, and in the smaller cylinder we produce a pressure by any means (whether by a column of water or by pressing down upon the surface with a piston), it will follow that the pressure exerted on the piston of the other cylinder (being the same for each square inch) will be greater in proportion to the greater area of this cylinder.

This fact was laid hold of by JOSEPH BRAMAH in inventing the press which still goes by his name, and all other forms of hydraulic presses have followed in due course.

MEANS OF PRODUCING REQUIRED PRESSURE.

In some the pressure is produced by means of a pump, in some, by a column of water communicating with a high reservoir, sometimes the pressure is stored up by the water being forced into a cylinder, on the piston of which is a heavy weight, while in other cases the smaller cylinder has a piston gradually forced into it by a screw. In some cases the power of a column of water is multiplied by allowing it to act on a large piston, and connecting this piston directly with a small piston; thus, the whole weight of the water on the large piston is concentrated on the small one, which again communicates its power to the press. In our patent "Accumulator" Pump, the power of steam, acting on a large piston, is in the same way concentrated on two small pistons, which work the press.



ENLARGED VIEW

Although many improvements have been introduced into various parts of the construction of hydraulic presses, the general principle remains the same, and we sometimes find that even now it is not possible materially to improve upon the patterns which our firm used over 40 years ago. Many of our presses made at that time, are still in full use, and as good as new.

DESCRIPTION.

The engraving shows a section of a hydraulic press of a form commonly in use.

A is a pump cylinder of small diameter, say one inch, with plunger B and valves C. This pump communicates by the pipe D, with the larger cylinder E, in which is a plunger (or "ram" or piston) F, the diameter of which is perhaps 10 inches.

To prevent the water escaping from the cylinder E, a recess is made near the top at H, in which is placed a cup leather or leather ring of peculiar construction, which can be easily inserted when the plunger F is drawn out.

On the top of F is the rising table G which distributes the pressure over the surface of the substance to be compressed, and forces it against the head L. The bed J supports the cylinder, and is sometimes cast in one piece with it. The "Tension Bars" or Pillars K K hold the head and bed together, and take the thrust of the press. The dotted portion below the head L is termed the "Mullet," and is not generally required unless the material is pressed in a box, placed on the table G.

In the example above given, it is evident that, as the smaller piston has a diameter of 1 inch, and the larger one of 10 inches, the area of the latter is one hundred times that of the former; therefore by exerting on the smaller piston (by means of a lever M), a weight of one ton, you get a pressure of 100 tons in the larger or press cylinder.

RELATION BETWEEN SPEED AND POWER.

It is well to bear in mind, that in all mechanical devices for increasing *power*, (such as compound Pulleys, Levers, &c., &c., and including the hydraulic press), you *lose in speed in exactly the same proportion as you gain in power*. Thus, in the above example, your smaller piston will have to travel downwards 100 inches for every inch that it raises the larger piston. This is a point to be borne in mind, as in very many cases it is an important question, how far *speed* of working, may be sacrificed to additional *power*. Various means are used to get over this difficulty, but the most usual is to have pumps of two sizes, the larger one (known as the "Speed Pump,") raises the press rapidly at first, but is unable to give the full power required; when the load is partly compressed, the smaller (or "Power Pump") is set to work and exerts the full pressure needed. The direct-acting "Accumulator Steam Pump," which we introduced some years ago, accomplishes the object in another way, by working rapidly while the pressure is slight, and gradually decreasing in speed, until the full power is attained.

THE FOLLOWING FACTS MAY BE INTERESTING TO OUR FRIENDS AND CUSTOMERS:—

JOSEPH BRAMAH patented the Hydraulic Press in 1796.* His pupil, Mr. W. **RUSSELL**, who appears to have been with him at the time of the invention, began, in 1815, to manufacture these presses (and other machines invented by his Master), at works in Clerkenwell. In 1827, Mr. **RUSSELL** was joined by Mr. **JOHN BRIGGS**, who still remains as our valued adviser and assistant. In 1834, Mr. **RUSSELL'S** business passed into the hands of Mr. **HAYWARD TYLER**, who continued it with the able assistance of Mr. **JOHN BRIGGS**, and finally removed it to its present location in Upper Whitecross Street, London. In 1855, Mr. **HAYWARD TYLER** having died, the business was carried on by Mr. **ROBERT L. HOWARD** who, with his brother **E. HOWARD**, are the present proprieters. In the course of time a number of the patterns possessed by the **BRAMAHS** passed into the hands of our firm, and we believe that we can claim, not only to be the oldest existing makers of Hydraulic Presses and some other branches of machinery, but to possess a larger and more varied stock of patterns than any other firm, to which stock we are constantly adding any improvement that experience can suggest, or modern demands require.

TECHNICAL TERMS USED FOR VARIOUS PARTS OF PRESSES.

In this Catalogue of Hydraulic Presses, &c., the following names are generally used for the various parts:—

A	"Pump."
B	"Pump Plunger."
C	"Pump Valves."
E	"Press Cylinder," or "Cylinder."
F	"Ram."
G	"Rising Table," "Follower," or "Platten."
H	"Cup-leather," or "Press-leather."
J	"Bed."
KK	"Press Bars," or "Pillars," or "Tension Bars."
L	"Head."
M	"Pump Lever."
N	"Mullet," used in presses which work with a box on the Follower.

---

* **BRAMAH'S** patent, dated March, 1796, is very interesting, as showing that he not only had grasped the principle of the hydraulic press itself, but anticipated many of the applications of hydraulic power which have since been perfected. He mentions the application of water or other dense fluids to various engines, so as in some instances, *to cause them to act with immense force*, in others *to communicate the motion and power of one part of a machine to some other part of the same machine*, and lastly *to communicate, the motion and force of one machine to another where their local situations preclude the application of all other methods of connection.*

"Circular Inches."

In reckoning the areas of hydraulic presses, the above term is frequently employed. A "circular inch" is the area of a circle, the *diameter* of which is one inch, just as a "square inch" is the area of a square, the *side* of which is one inch. Now, as the areas of circles bear the same proportion to their diameters that squares bear to their sides, it is evident that the number of "circular inches" in any circle is obtained by squaring the diameter. Thus, a press-ram of 10 inches diameter contains 100 "circular inches," or, in other words, has one hundred times the area of a ram one inch in diameter. This affords a much more rapid means of calculating the relative pressures on circles of various sizes than by reducing the areas to square inches. Of course a pressure of one ton per square inch gives only $\frac{7854}{10000}$ of a ton per "circular inch"—that being the proportion of the area of a circle to the square of its diameter.

The Pressures usually Employed in Working.

The pressure at which various classes of hydraulic presses and lifts work is as follows:—

Presses or lifts worked by the water from a cistern at the top of the building have a pressure in proportion to the height of the building, amounting generally to 20 or 30 pounds per square inch; being about one pound to every two feet of height. Water-works mains sometimes give a pressure for this purpose of 100 pounds or more per square inch.

In Docks, or large ranges of warehouses where hydraulic pumping engines are erected and high-pressure mains laid down, the pressure used is from 400 lbs. to 1,500 lbs. per square inch—the most usual being about 700 pounds.

Hydraulic presses, worked by separate pumps, are generally constructed to work at about two tons per circular inch, or about two-and-a-half tons per square inch. A pressure of three tons per square inch used to be the highest employed, but since the introduction of steel cylinders and other improvements, it is possible to work at a higher pressure. Of course, the greater the pressure is, the greater the difficulty in keeping all pipes, valves, &c., tight.

Most of our presses are arranged to work at a pressure of two tons per circular inch, but we can always adapt them to lighter pressures by putting in a larger ram, if from any cause that pressure is not attainable; or, on the other hand, we can construct them with steel cylinders, to work at three or four tons per square inch, if it is necessary to reduce the bulk and weight of the machine as much as possible.

THE FOLLOWING PRACTICAL NOTES ON THE SIZES OF BALES &c. MAY BE FOUND USEFUL.

Cotton Bales vary from 4 to 5ft. long, and from 1ft. to 2ft. 6in. in width and depth. Their weight varies from 300 to 550 lbs. The dimensions are different at different shipping ports, thus, Indian Bales weigh from 350 to 400 lbs.; American Bales 400 lbs. to 500 lbs.; Egyptian Bales about the same. Loose Cotton after being ginned, weighs about 5 lbs. to the cubic foot. When trodden thoroughly into a box, we find it weigh 11 lbs. to the cubic foot, and the usual density when compressed into bales, is from 25 to 35 or 40 lbs. per cubic foot. To compress it to the mean of these weights, or say, 33 lbs. per cubic foot, requires about 4 tons per square foot of area. This however is not by any means the limit to which the Cotton may be compressed by a proper system of pressing and securing when pressed.

Ft. In. Ft. In. Ft. In.

Calcutta Bales of Hemp, measure ... 4 " 8 × 2 " 0 × 2 " 0

Calcutta Bales of Jute, measure ... 3 " 6 × 2 " 0 × 1 "

Bombay Bales of Hides, measure ... 7 " 0 × 3 " 0 × 2 " 0 and weigh 17 cwt.

Bales of Cocoa-nut Fibre ... 3 " 0 × 2 " 0 × 2 " 0 weigh 400 lbs.

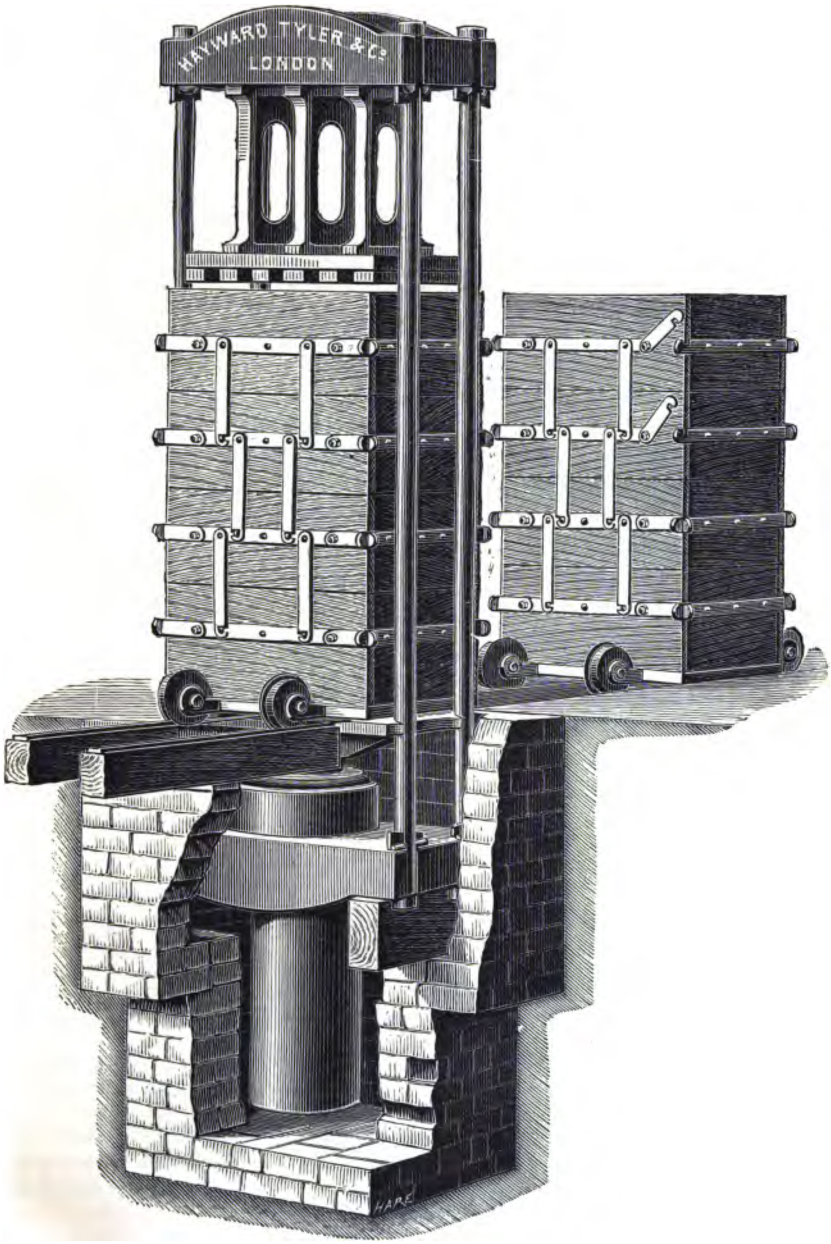
Bales of Wool, as received in London, measure 5 " 0 × 2 " 6 × 2 " 6 and are "dumped" into about half that length.

Inches.

Bales of Hay, after hydraulic packing, measures about 34 × 32 × 20, and weigh 2 cwt. 2 qrs. 0 lbs. or say, 21½ lbs. per cubic foot.

NOTE.—Very great pains have been taken by the writer, in compiling the following tables, that users of Hydraulic and Screw Presses may have every detail of weights, powers, shipping dimensions and prices, before them as clearly as possible, to guide them in ordering; but it must be understood that the figures cannot be guaranteed to be in all cases absolutely exact, and that prices in particular are liable to variations of which the reader may not have received notice. It may however be added, that with our improved machinery and the great convenience for every detail of manufacture afforded by our Luton Works, we are at all times able to execute hydraulic press work at the lowest prices current for good materials and workmanship. Particular attention is drawn to the *power* of these presses, as our hydraulic presses are *all* (unless otherwise stated) proportioned to work up to a pressure of 2 tons per circular inch, (about 2½ tons per square inch), and tested to this pressure before leaving our works; they will therefore be found of much greater power than presses by some other makers of nominally the same size. The *weights* given are the approximate shipping weights, and the *dimensions* the approximate shipping dimensions.

PRESSES FOR PACKING LOOSE MATERIALS INTO BALES.



PRESSES FOR PACKING LOOSE MATERIALS INTO BALES.

Presses of this form are used for Wool, Raw Cotton, Rags, Silk, Cotton Wool, Linen-Yarn, Tobacco, India Rubber, Dye Woods, &c.

These presses are provided with one or more boxes of oak or other hard wood, which run on wheels in and out of the press.

The wool, cotton, or other loose material is thrown into the box, while the box is outside the press, a piece of canvas or sacking being first placed at the bottom to form the bottom cover of the bale. It is packed as closely as possible, by stamping with the feet, &c., or hammering down with mallets, and, after covering with another piece of canvas, the box is run into its place on the rising table, and the press is set to work. As the platten rises it lifts the box and presses the contents against the fixed mullet, which passes inside the box. The box being made in segments, the upper segments are taken off as the box rises. The rising table and mullet are provided with faces of ribbed, hard wood, through which the hoops or ropes are drawn tight when the bale is sufficiently compressed. (For tools used in tightening and rivetting the hoops, &c., see further, page 22.) The boxes are strongly bound with iron plates, with catches at the corners. These catches are made in various ways, to suit different customers, and we sometimes arrange a bolt to throw out several at one operation, but we recommend the form shown in engraving as being one of the simplest to fasten and unfasten, and having no loose key or pin, besides, being, perhaps, the strongest. The vertical catches to prevent the boxes separating when the pressure is taken off, are an addition now frequently made, but not included in the prices given, as some customers consider them needless.

It is strongly recommended to have two boxes to work alternately, one being filled while the other is being pressed and hooped. By this means, and by adopting a proper system of pumps, the operation of baling may be reduced to a very short time.

All these presses are made with wrought iron pillars, of great strength, turned bright, and with solid ends forged on, or strong nuts screwed to the ends.

The press is shown without pumps, as these differ according to circumstances. The various forms of pumps will be found fully described further on.

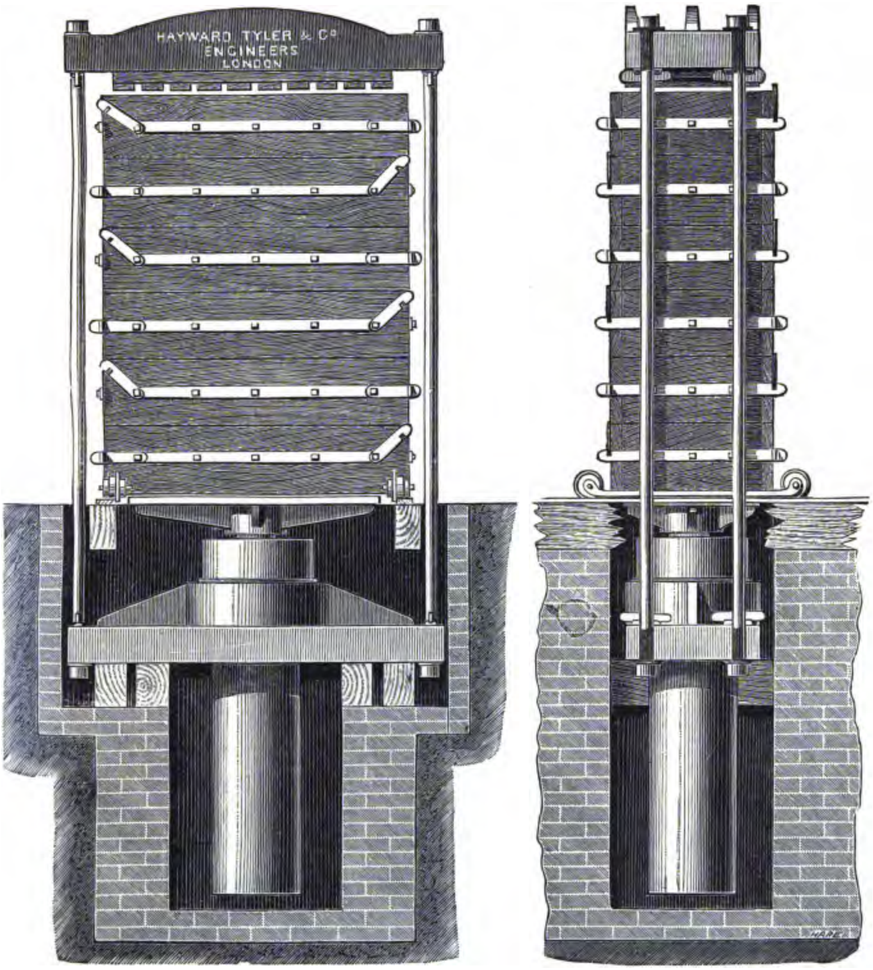
The prices of the *presses* include the Mullet and ribbed face of hard wood. The prices of *boxes* include a pair of iron rails for laying on the floor, for the box to run out on.

We annex for the guidance of our Customers some of the sizes of Presses and Boxes most generally asked for, but these dimensions may be widely varied according to the size of bale required, and the amount to which it is to be compressed, &c. When a press is suited for a special purpose it is mentioned in column 9, but every press is applicable to pack a variety of material : of course the *depth* of the bale when compressed depends partly on the nature of the material.

Diam. of Ram	Power of Press at 2 tons per circ. inch	Size of Bale when pressed	Depth of Box	Rise of Ram	Approx. weight of press without Boxes	Approx. dimensions of Press packed	Approx. dimensions of Box packed	REMARKS Special purposes for which Press is adapted	Price of Press only	Box and rails	Pumps
Inches	Tons	Ft. Ins. Ft. Ins. Ft Ins.	Ft. Ins.	Ft. Ins.	Cwt.	Cub. Ft.	Cub. Ft.		£		
3	18	2 ″ 6 × 1 ″ 8 × 1 ″ 8	3 ″ 4	1 ″ 8	22	20	8	For small Bales of Wool.	40	15	**For Single Pump, Class A, (attached to bed of press) add £7 10s.** **For Double Pumps Class B, (attached to bed of Press), which serves as cistern, £20** **For Single Pump, Class B, on strong cistern, add £15** **For Double Pumps, 1 and 2in., Class B, on strong cistern, add £25** **For Double Pumps, 1 and 2in., Class C, on strong cistern, add £38** **For Steam Moved Pumps, See Catalogue of Pumps**
3	18	3 ″ 0 × 2 ″ 0 × 1 ″ 0	2 ″ 6	1 ″ 6	22	16	10	For Baling India Rubber.	40	15	
4	32	4 ″ 0 × 2 ″ 0 × 1 ″ 6	4 ″ 6	3 ″ 0	38	40	13	For Wool or Cotton.	56	26	
5	50	4 ″ 0 × 2 ″ 0 × 1 ″ 6	3 ″ 0	1 ″ 6	42	39	12	{ To compress 6 cwt. Logwood into bale.	60	18	
5	50	4 ″ 0 × 2 ″ 0 × 1 ″ 6	4 ″ 0	2 ″ 6	45	37	15	For Cotton or Wool.	62	22	
6	72	3 ″ 0 × 3 ″ 0 × 1 ″ 2	2 ″ 8	1 ″ 6	45	38	12	For compressing Linen Yarn.	68	18	
6	72	4 ″ 0 × 1 ″ 6 × 1 ″ 6	5 ″ 9	4 ″ 6	65	58	19	For Wool or Cotton.	92	29	
6	72	4 ″ 0 × 2 ″ 0 × 1 ″ 6	4 ″ 0	2 ″ 6	54	50	15	For Wool or Cotton.	78	26	
6	72	4 ″ 0 × 2 ″ 0 × 2 ″ 0	4 ″ 6	2 ″ 6	56	51	13	For Cocoon Silk, (300 lb. bale).	80	28	
6	72	4 ″ 0 × 2 ″ 0 × 1 ″ 6	3 ″ 0	1 ″ 6	52	54	13	For packing Tobacco.	75	24	
6	72	4 ″ 3 × 2 ″ 3 × 2 ″ 3	4 ″ 6	3 ″ 0	58	56	14	For Wool or Cotton, (450 lb. bale).	85	34	
6	72	4 ″ 0 × 2 ″ 3 × 1 ″ 6	4 ″ 6	3 ″ 0	54	58	14	For Wool or Cotton, (400 lb. bale).	80	30	
8	128	4 ″ 0 × 2 ″ 0 × 1 ″ 6	4 ″ 6	3 ″ 0	79	65	13	For Wool or Cotton.	103	30	
8	128	4 ″ 0 × 2 ″ 0 × 2 ″ 0	5 ″ 0	3 ″ 0	80	66	15	For Wool, Cotton or Camels hair	105	32	
8	128	5 ″ 0 × 2 ″ 6 × 1 ″ 6	4 ″ 9	3 ″ 3	103	84	22	For Wool or Cotton.	130	40	
9	162	5 ″ 0 × 2 ″ 6 × 1 ″ 6	5 ″ 0	3 ″ 6	109		23	do.	140	45	
10	200	4 ″ 0 × 1 ″ 9 × 1 ″ 0	4 ″ 0	3 ″ 6	125	98	20	For Cotton-Wool, &c.	150	35	
10	{ To work at 1000 lbs. pressure per square in., power 35 tons.	5 ″ 0 × 2 ″ 6 × 1 ″ 6	4 ″ 0	2 ″ 6	100	75	24	For Wool or Cotton.	115	35	

NOTE.—Prices include free delivery at Rail or Docks in London. Packing for Export amounts to about 2 to 4 per cent.

PRESSES FOR PACKING LOOSE MATERIALS INTO BALES.



PRESSES FOR
PACKING LOOSE MATERIALS INTO BALES.

Presses of the form shown on page 13 are used for loose materials requiring considerable compression, such as Raw Cotton, Rags, Cocoa Nut Fibre, or Loose Hay, as well as Wool, &c. The box is generally of considerable depth, and it remains stationary during pressing, while the Follower or Platten rises inside it. The box is provided with a loose bottom, which rises with the follower.

In some cases the boxes run in and out of the press on wheels as shown in engraving, and in that case the material is first stamped into them outside the press: two boxes can then be used alternately, one being filled while the other is in the press. In other cases the box is partly attached to the Pillars of the Press, the front and back opening in segments to allow of filling and also of hooping and removing the bale when compressed. The latter plan is more convenient when the Box requires to be of great depth.

The loose bottom and head of press are provided with ribbed wooden plates for passing the hoops or lashings through.

All these presses are made with wrought iron pillars, of great strength, turned bright, and with solid ends forged on, or strong nuts screwed to the ends.

The press is shown without pumps, as these differ according to circumstances. The various forms of pumps will be found fully described further on. *(See Catalogue of Pumps.)*

Prices include free delivery at Rail or Docks in London. Packing for Export amounts to about 2 to 4 per cent.

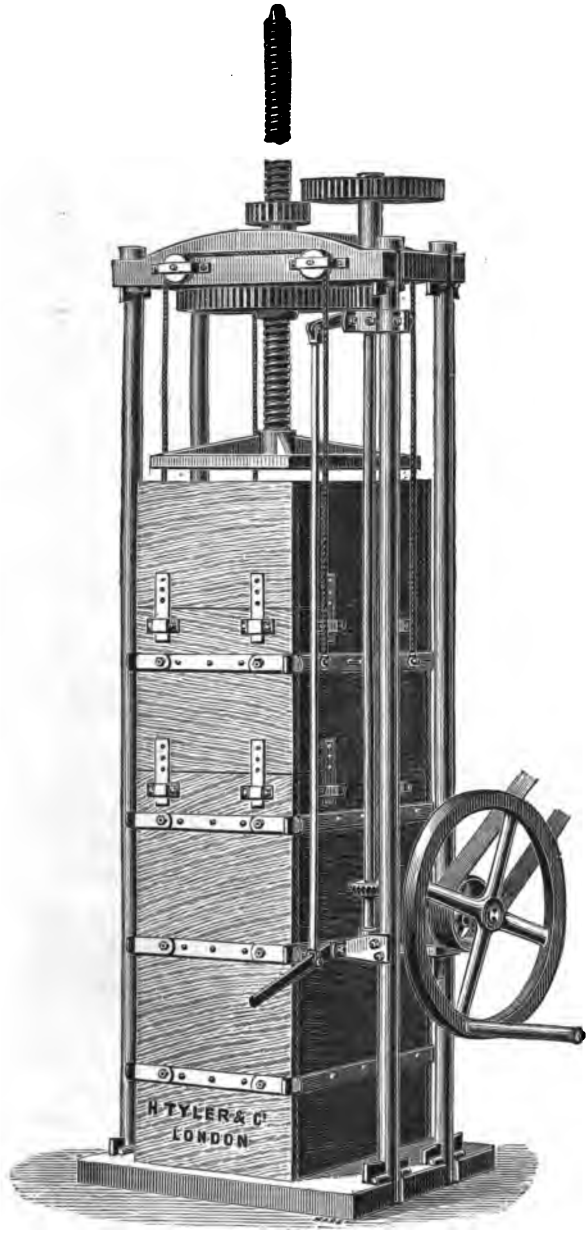
The price of the *press* includes the hard wood ribbed facing of the head. The price of the *boxes*, where marked "loose box," includes a length of rails for laying on the floor, for the box to run out upon.

PRESSES FOR PACKING LOOSE MATERIALS INTO BALES.

The following are some of the sizes of presses most generally required, and the purposes for which they may be considered specially adapted, but our patterns admit of very wide variations according to the different sizes of bales, amount of compression required, &c.:—

Diam. of Ram	Power of Press at 2 tons per circ. inch	Size of Bale when pressed	Depth of Box	Rise of Ram	Approx. weight of Press without box	Approx. dimensions of Press packed	Approx. dimensions of Box packed	REMARKS Special purpose for which Press is adapted	Price of Press only	Box	Pumps
Inches	Tons	Ft. Ins. Ft. Ins. Ft. Ins.	Ft. Ins.	Ft. Ins.	Cwt.	Cub. Ft.	Cub. Ft.		£	£	
6	72	4 " 6 × 2 " 0 × 2 " 0	10 " 0	8 " 0	82	70	38	For Raw Cotton, Wool, &c., (fixed box).	105	50	For Single Pump, Class A, attached to press, add £7 10s. For Double Pumps, Class B, attached to bed of press, £20 For Single Pump, Class B, on strong cistern, add £15 For Double Pumps, 1 and 2in., Class B, on strong cistern, add £25 For Double Pumps, 1 and 2in., Class C, on strong cistern, add £38 For Steam Moved Pumps, &c., See Catalogue of Pumps.
6	72	4 " 6 × 2 " 6 × 1 " 6	9 " 6	8 " 0	85	64	39	do.	108	50	
6	72	4 " 6 × 2 " 6 × 2 " 0	10 " 0	8 " 0	85	67	38	do.	110	55	
6	72	4 " 0 × 2 " 0 × 1 " 6	5 " 0	3 6	66	53	20	Rags, &c., (loose box).	83	30	
8	128	4 " 0 × 2 " 0 × 1 " 6	5 " 0	3 " 6	90	68	21	For Cocoa Nut Fibre, to make Bales 400 lbs. ea., (with loose boxes)	110	32	
8	128	3 " 6 × 2 " 0 × 1 " 6	6 " 0	4 " 6	95	68	26	For Rags, Wool, &c., (with loose boxes).	118	30	
8	128	4 " 6 × 2 " 3 × 2 " 0	6 " 0	4 " 0	108	82	28	do.	130	42	
8	128	5 " 0 × 2 " 0 × 2 " 0	6 " 0	4 " 0	108	72	30	For Rags, &c., (loose box). To compress 60 cub. feet of Rags to 20 cubic feet.	130	45	
8	128	4 " 6 × 2 " 0 × 2 " 0	10 " 0	8 " 0	122	83	40	For Cotton, &c., (fixed box).	148	60	
9	162	5 " 0 × 2 " 6 × 2 " 0	10 " 0	8 " 0	140	93	55	do.	165	65	
10	200	5 " 0 × 2 " 0 × 2 " 0	9 " 0	7 " 0	155	98	54	For Hay, &c., (loose box).	185	70	

COMPOUND SCREW PRESSES, FOR PACKING COTTON, WOOL, &c.



COMPOUND SCREW PRESSES, FOR PACKING COTTON, WOOL, &c.

In many cases a preference is given to screw presses over hydraulic presses, owing to the greater lightness of the parts for transport, and the fact that this class of press is better understood by natives, although, of course, the same power cannot be obtained by this means. The material sent down to port, prepared in this way, is commonly termed "half pressed." These presses are made in various forms, according to the power required, &c. The engraving represents a very complete and convenient press which we have made for Colonial use. There are two sets of gearing wheels of different speed and power, either of which can be thrown into work by the hand-lever in front. When the pressing begins, the quicker speed is used, and the follower rapidly pressed down upon the material. When the pressure becomes too great for the press to be longer worked in this way, the slower speed, with greater power, is thrown into gear, and the packing completed. The screw is worked by hand, or by a strap from a pulley attached to steam, horse, or bullock gear. The box is made in three segments. The two upper ones are attached to cords and a counter weight, so that they can be pushed up out of the way when the material is pressed down within the bottom half. This lower half is then taken apart by undoing the catches. This press can be used for hooping or lashing bales, or a bag can be suspended in the lower half of the box into which the material is forced, and when the upper segments are removed, the bag is secured in the usual way.

Usual Dimensions of above Press:—Box, 2ft. 3in. square, by 8ft. 6in. deep; screw travels 4ft. 6in.; will pack 4 cwt. unwashed wool in a bale 4ft. 6in. x 2ft. 3in. x 2ft. 3in. The power of this press when worked by two men is about 14 tons, and when driven by a belt, about 17 tons.

The press is made with strong cast-iron head, bed, and follower, strong wrought-iron turned pillars, screw of best hammered iron working in gun-metal bush, wrought-iron spindles, levers, and handles, cast-iron gearing wheels, fly-wheels, and counterweights. Weight about 33 cwt.

The boxes of strong oak or other hard wood, bound with wrought-iron plates with catches for taking apart, &c.

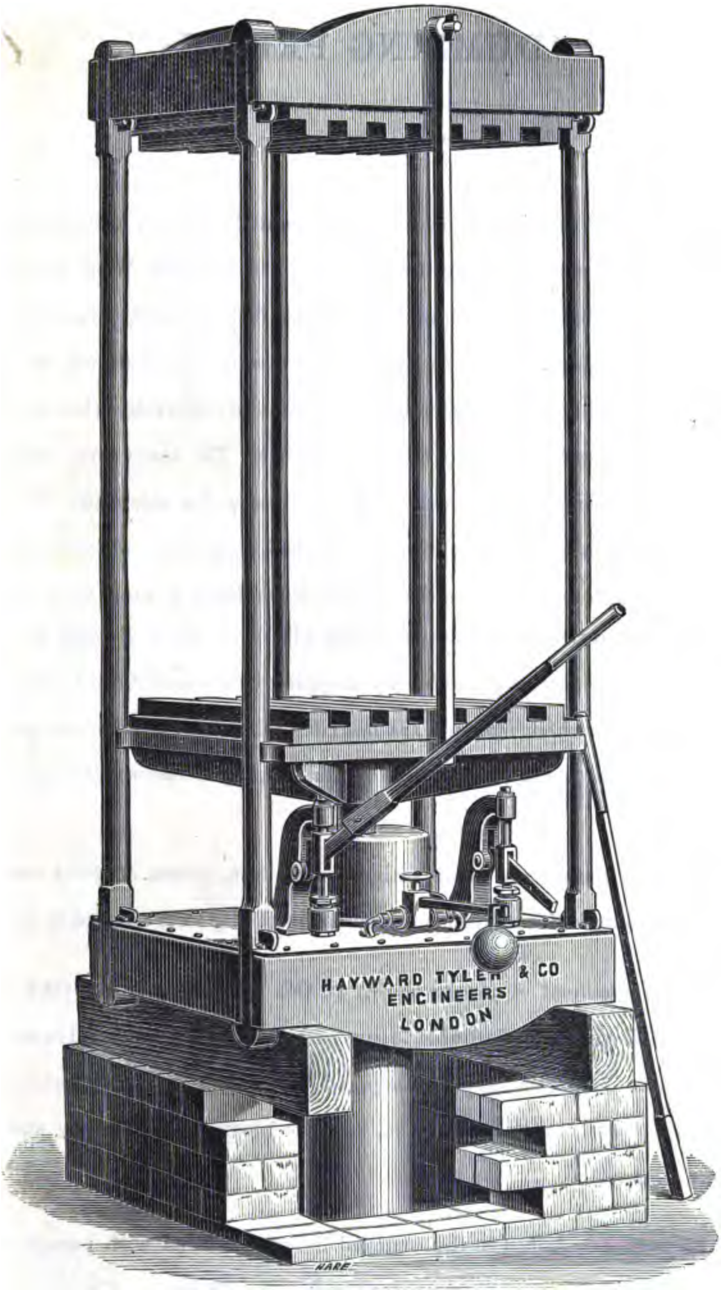
Two or three boxes should be used, so that the material may be trodden into the box while another is being pressed.

The Boxes may be constructed to run on wheels, if required, at a small additional cost.

Price of the above press, delivered at Docks or rail in London	£100	0	0
Packing for Export	£2	0	0
Price of each Box, delivered as above	£30	0	0
Packing for Export, in case	£2	0	0

Approximate shipping dimensions of press and box, packed, 42 cubic feet.

"DUMPING" PRESSES,



Or Presses for reducing the size of Bales already packed up country, by Screw Presses, &c., and bringing two or three Bales into the compass of one.

"DUMPING PRESSES."

These Presses are much used by Shippers and Merchants for reducing bulk before shipping, and so saving freight. In the London Wool warehouses, for example, the Bales of Wool are brought in 5 ft. long x 2 ft. 6 in. x 2 ft. 6 in. and after "Dumping" with a 5 inch press they measure 3 ft. x 2 ft. 6 in. x 2 ft. 6 in. In some cases the bales are very much more reduced, especially when they have been only imperfectly pressed in the first instance. The same form of press is also used for other purposes, such as packing straw for shipment. The press is provided with a strong bar of flat or T shape iron at back and front, to steady the bales during pressing: these bars are attached in such a way that they can be readily moved when the Bales are being placed or removed, and as readily secured in their places again, either by dropping into a socket or by hinges and keys, as may be most convenient. The head and follower of the press are provided with ribbed hard wood plates, to allow for hooping or lashing the bales when pressed.

All these presses are made with wrought-iron pillars, of great strength, turned bright, and with solid ends forged on, or strong nuts screwed to the ends.

The arrangement of pumps shown in this engraving is one that can be recommended where it is desirable to save *space* both in shipment and in working, there is also a saving in cost as compared with pumps on a separate cistern. The pumps are of very strong make, and are provided with safety and relief valves complete.

The presses described in the annexed list can be fitted with pumps of this form or adapted for pumps on a separate cistern. The *prices* of presses are all without pumps.

ANNEXED ARE THE SIZES GENERALLY USED FOR DUMPING PRESSES.

We can make Presses of this description of any size and power required.

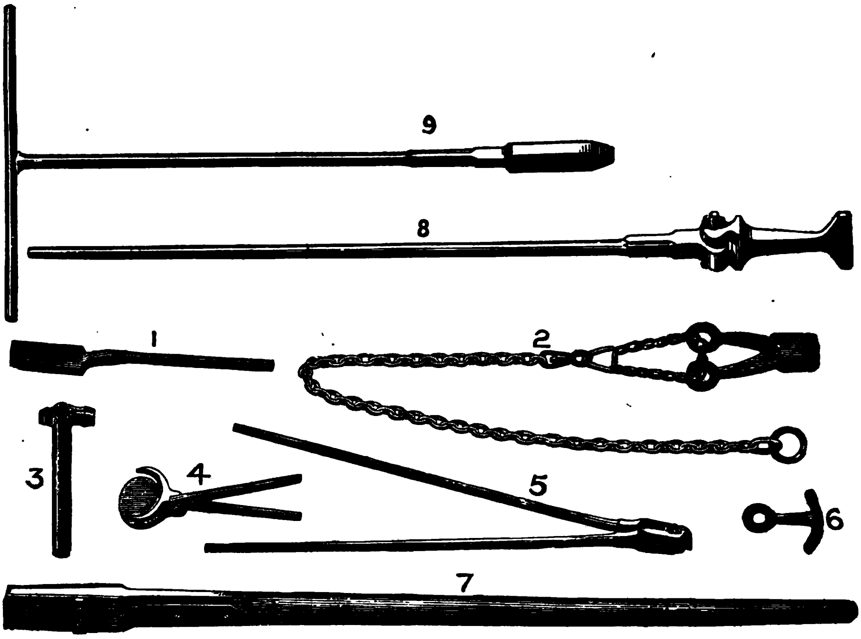
Diam. of Ram	Power at 2 Tons per circ. inch	Length of Table between bars	Breadth of Table Back to Front	Height from Table to Head	Rise of Ram	Approx. weight of Press	Approx. dimensions packed	Remarks	Price of Press
Inches	Tons	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Cwt.	Cub. Ft.		£ s. d.
5	50	2 " 8	1 " 10	4 " 4	1 " 4	32	18	For Dumping Bales	50 0 0
5	50	2 " 8	2 " 6	6 " 0	3 " 0	42	30	do.	63 0 0
5	50	3 " 0	2 " 6	6 " 6	3 " 0	44	35	do.	65 0 0
5	50	4 " 6	2 " 0	4 " 8	2 " 0	42	33	Ditto, or for Straw, to press 6 trusses into 1 weighing 216 lbs.	60 0 0
6	72	3 " 0	2 " 6	10 " 0	8 " 0	68	48	Hay, to press 6 trusses into 1 weighing 280 lbs.	90 0 0
5	50	3 " 2	2 " 6	7 " 9	5 " 0	56	50	Hops	78 0 0

The latter press is made with a loose head to adjust to different lengths of bales. It has moveable bars at ends as well as at back and front for steadying the bales while pressing.

PUMPS.

If with one pump Class A (see page 37) attached to press, add	£7 10 0
If with two pumps Class B attached to press, as in Engraving page 19, add	£20 0 0
If with above pumps (2in. and 1in.) on separate cistern, add	£25 0 0
If with one pump class C, on separate cistern, add	£25 0 0
If with two pumps (2in. and 1in.) Class C, on separate cistern, add	£38 0 0

TOOLS USED IN HOOPING OR ROPING BALES, WHEN PACKED BY HYDRAULIC PRESSURE.



The annexed Engraving shews a complete set of the tools required in the processes of securing bales either with ropes or hoops, in connection with either Hydraulic or Screw Presses.

1.—**Paddle**, to put between the Bale and the Clams (4) to make it solid while rivetting.

2.—**Dogs**, to pull the hoops over the Bale.

3.—**Hammer**, for rivetting.

4.—**Clams**, to hold the hoops tight while rivetting.

5.—**Punches**, for punching holes in the hoops for rivetting.

6.—**Anchor**, for use instead of the Dogs when the bale is *roped* instead of being *hooped*.

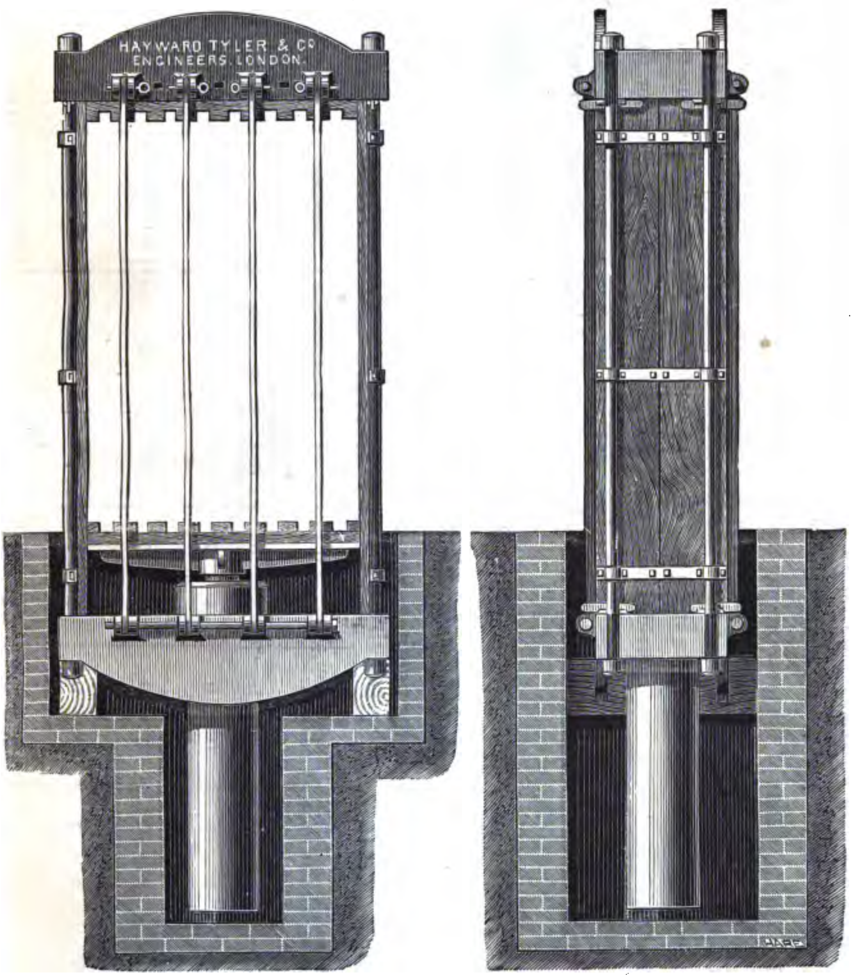
7.—**Wood and Iron Lever**, to pull the Dogs tight when they have hold of the hoops.

8.—**Patent Reversible Lever**, for pulling the hoops tight; also called "Tommy and Joey," as one man can, by the use of this tool, do the work of two.

9.—**Jack-Sharp**, for cutting the hoops when a bale is to be opened.

Price of Set, Nos. 1 to 7, complete £5 10 0
Price of No. 8, £2; No. 9, 8/-

BALING PRESSES,



WITH WOODEN SIDES, AND MOVEABLE BARS, AT BACK AND FRONT.

Presses of this description are used for compressing into bales materials which are not loose enough to require a box: such as Hemp, Flax, New Zealand Flax, Hay, Straw, Esparto Grass, and also Wool.

The wooden sides fixed to the pillars of the press prevent the material escaping at the sides, and the back and front are provided with moveable bars attached in such a way as to be easily taken out of place or replaced. Sometimes these bars move on a hinge at the bottom, (forming, when thrown down, a pathway for removal of finished bale), and are secured by pins at the top; sometimes they are hinged at the top and drop into shoepieces at bottom, or they pass through eyes at top and drop into sockets at bottom, as may be most convenient to the customer.

The Head and Rising Table of the Press are provided with Ribbed Plates of hard wood to allow for passing the hoops or lashings through when the bale is compressed.

All these presses are made with wrought-iron pillars, of great strength, turned bright, and with solid ends forged on, or strong nuts. screwed to the ends.

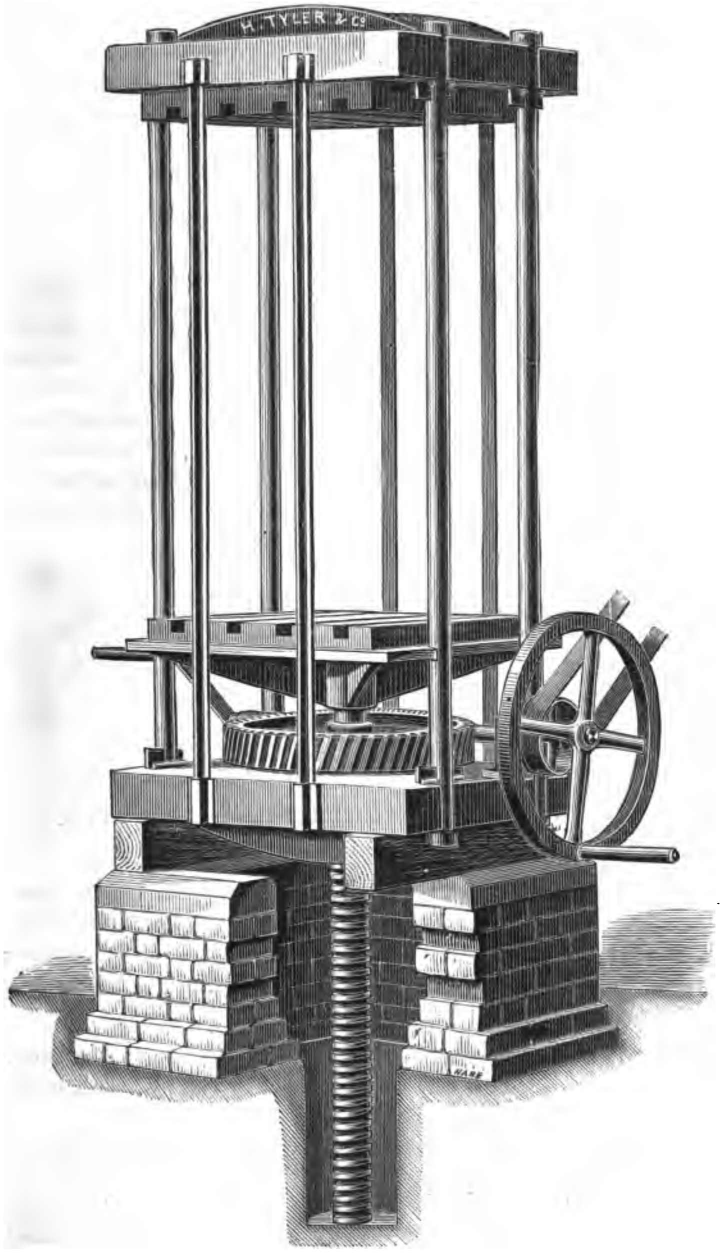
The press is shown without pumps, as these differ according to circumstances. The various forms of pumps will be found fully described further on, in Catalogue of Hydraulic Press Pumps.

Prices include free delivery at Rail or Docks in London. Packing for export amounts to about 2 to 4 per cent.

The following are sizes generally useful; we can, however, make this description of press to any required dimensions or power.

Diam of Ram	Power at 2 tons per circ. in.	Length of Table between pillars	Width of Table back to front	Height from Table to Head	Rise of Ram	Approx. weight of Press with sides & bars	Approx. dimensions of Press packed	Remarks	Price of Press	Pumps
Inches	Tons	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Cwt.	C. Ft.		£ s. d.	If with one pump Class A, attached to bed of press, which also serves as cistern, add - - £7 10 0 If with two pumps Class A, 2 & 1 in., add- - £12 10 0 If with one pump Class B, in strong separate cistern, add - - - - - £15 0 0 If with two pumps Class B, 1 & 2 in. separate cistern, add - - - - - £25 0 0 If with two pumps Class C, 2 & 1 in. separate cistern, add - - - - - £38 0 0 For steam moved pumps, &c. see press pump Catalogue.
6	72	4 " 0	2 " 0	6 " 0	4 " 0	58	64	Hemp, wool, hay, straw, &c.	95 0 0	
6	72	4 " 0	2 " 0	7 " 0	5 " 0	68	67	Esparto grass &c.	110 0 0	
6	72	4 " 6	2 " 3	7 " 0	4 " 6	70	75	Wool, &c.	115 0 0	
8	128	5 " 0	2 " 3	5 " 0	3 " 0	93	65	New Zealand Flax	130 0 0	

SCREW PRESSES, FOR BALING HAY, HEMP, FLAX, WOOL, ESPARTO GRASS, NEW ZEALAND FLAX, &c., &c.



SCREW PRESSES, FOR BALING HAY, HEMP, FLAX, WOOL, ESPARTO GRASS, NEW ZEALAND FLAX, &c., &c.

In some cases Screw Presses are preferred to hydraulic presses, for the above purposes, both on account of the greater lightness of the parts for transport up country, and also because they are better understood by the natives, &c. These presses can be made in various forms, but that shown in engraving is one of the most convenient. The power is multiplied by the worm wheel, and also by the screw. The screw is worked by hand, or by a strap from any available power, or by a shaft from a bullock gear, &c.

The press may be made with the screw beneath, and a *rising* table, as shown, or with the screw above, and a *descending* table, if more convenient.

These presses are also made with oak boxes for packing wool, cotton, &c.

The press shown in engraving, has table 3 ft. 6 in. x 2 ft. 6 in., provided (as is also the head of press), with hard wood ribbed plates, for hooping and lashing the bales. The distance from head to table when down, is 6ft., and the screw travels 4ft. 6in. The head, bed, gearing, &c., are of strong cast-iron; the pillars are of best turned wrought-iron; the screw is of best hammered iron with thread well cut; the bars at back and front for steadying the load, are arranged to be easily shipped and unshipped, and the press forms a most convenient machine for colonial or up country work.

Weight of above press, 65 cwt.

Price, delivered at Docks or Railway in London, £

Packing, £2 10 0 extra.

Shipping dimension, about 50 cubic feet.

SCREW PRESS, FOR PACKING LOOSE GOODS.

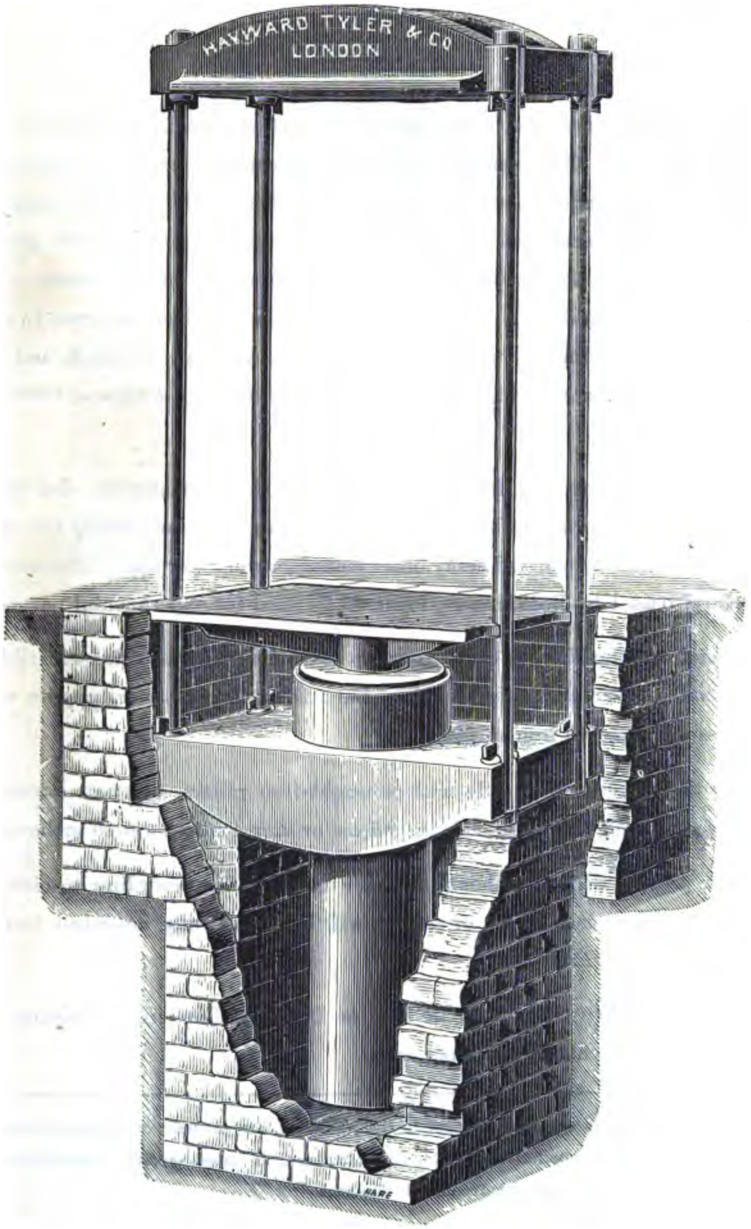
For this purpose we make a very powerful press with 5 inch screw, with 5 ft. 6 in. run-out, and capstan-head worked by four levers, each 11 ft. long. The capstan is attached to a massive gun-metal nut which revolves in the press-head, having two step bearings to prevent rapid wear. The head and bed are of great strength and connected by 4 strong wrought-iron pillars.

The box is of strong oak with iron bars and catches, in four parts, 7 ft. deep, and to make a bale 4 ft. long by 2 ft. wide. The whole is a machine of very unusual strength and durability.

Weight of press and box	Cubic contents when packed	Price of press and box
77 cwt.	90 cubic feet	£150

Lighter and less powerful screw presses can be made at a much reduced rate.

HYDRAULIC PRESSES, WITH PLAIN PRESSING SURFACES, OF VARIOUS DIMENSIONS AND POWERS.



HYDRAULIC PRESSES,

WITH PLAIN PRESSING SURFACES OF VARIOUS DIMENSIONS AND POWERS, FOR PACKING, &C.

These presses are used for a great number of purposes, according to their size and power. The form of press varies according to the arrangement required; the arrangements of the pumps also differ according to the purposes for which they are designed. The smaller sizes can be provided with pumps attached direct to the press, the bed of which serves as the cistern, *(See Illustration, Page* 19 & 35.*)* The larger sizes can be supplied with one, two, or more pumps according to the speed at which they require to work, and the power available for working them, *(for full particulars of Pumps see Catalogue of Press Pumps.)*

These presses are used for *packing* cloth and similar materials, also skins, flax, &c., &c., *cold pressing* cloth and other woollen goods, for *pressing the water* out of cloth after *dyeing*, and many other manufacturing purposes. The smaller sizes are also used by Bookbinders, Printers, &c., and for experimental purposes.

Sometimes the Head and Follower of these presses are provided with ribbed hard wood faces for lashing or hooping, but frequently customers require only the press with smooth iron surfaces.

All these presses are made with wrought-iron pillars, of great strength, turned bright, and with solid ends forged on, or strong nuts screwed to the ends.

The press is shown without pumps, as these differ according to circumstances. The various forms of pumps will be found fully described further on, in *Catalogue of Press Pumps.*

Prices include free delivery at Rail or Docks in London. Packing for Export amounts to about 2 to 4 per cent.

NOTE—Attention is especially drawn to the *power* of the presses; our presses being all constructed to work (if needful) up to 2 tons per circular inch, unless specified otherwise, thus giving much greater power than is frequently the case.

PACKING PRESSES.

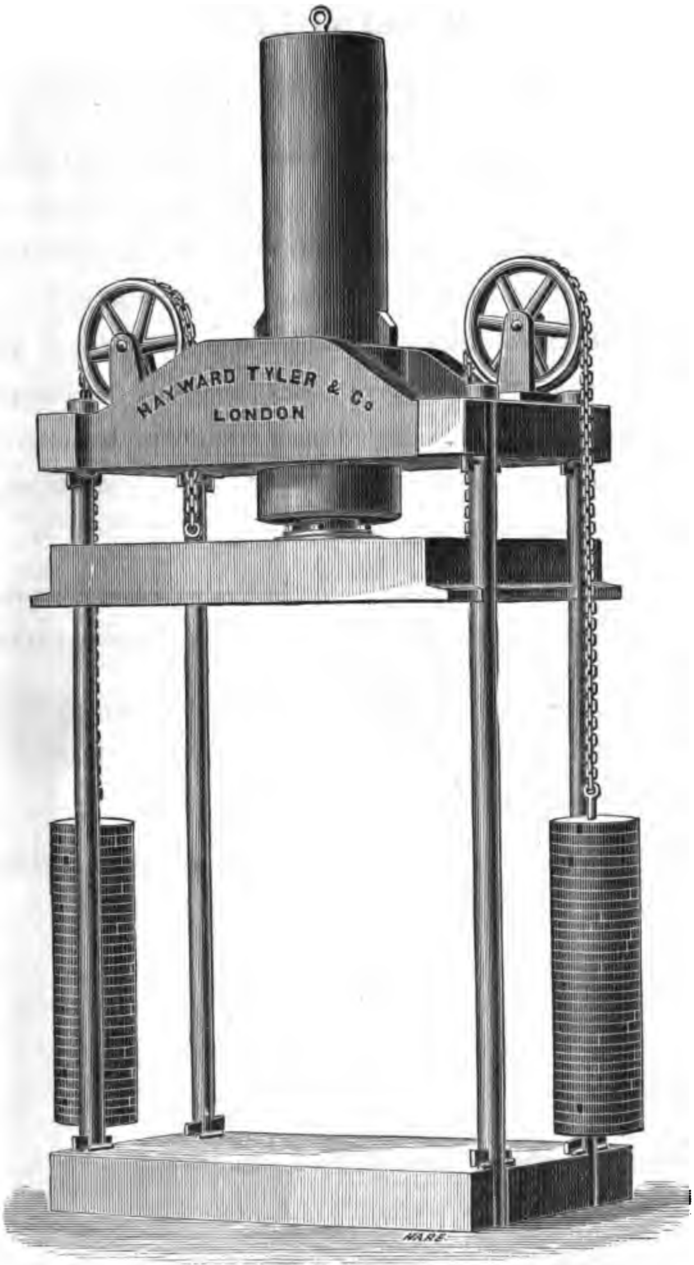
The following are given as examples of various sizes used for different purposes; but our patterns admit of every variation of dimensions and power. The height can be varied with great ease, and the rise of ram altered without expense of altering patterns. We have numerous patterns with smaller tables, but as these are not suited for packing, they are not inserted here.

Diam. of Ram.	Power of Press at 2 tons per circ. inch	Size of Table	Height Table to Head	Rise of Ram	Approx. weight of Press	Approximate dimensions of Press packed	Price of Press without Pumps	PUMPS
Inches	Tons	Ft. Ins. Ft. Ins.	Ft. Ins.	Ft. Ins.	Cwt.	Cubic Feet	£	
3	**18**	3 " 0 × 2 " 0	5 " 0	3 " 0	20	19	35	Most of the smaller sizes can be provided with Pump of Class A attached to bed of Press, which serves as cistern, as shown on page 35, add ... ... £ 7 10 0 Many of the larger sizes can be provided with 2 Pumps, 2 & 1 in., of Class B, attached to bed of Press, which serves as cistern, as shown on page 19, add ... £20 0 0 If with 1 Pump Class B on strong separate cistern, add ... ... £15 0 0 If with 2 Pumps Class B, 2 & 1 in., on strong separate cistern, add ... ... £25 0 0 If with 2 Pumps Class C, 2 & 1 in., on strong separate cistern, add ... ... £38 0 0 For Steam Moved Pumps, &c., see Catalogue of Pumps.
4	**32**	2 " 6 × 2 " 2	2 " 6	1 " 6	18	17	30	
4	**32**	4 " 0 × 3 " 0	6 " 0	2 " 6	32	33	48	
5	**50**	2 " 6 × 1 " 5	2 " 8	1 " 2	22	15	38	
5	**50**	2 " 8 × 1 " 10	4 " 4	1 " 4	32	17	45	
5	**50**	3 " 0 × 2 " 6	6 " 0	3 " 0	38	25	52	
5	**50**	3 " 4 × 1 " 10	6 " 0	4 " 0	44	27	60	
5	**50**	3 " 4 × 2 " 8	8 " 0	4 " 0	46	29	65	
5	**50**	4 " 6 × 2 " 4	6 " 0	3 " 0	43	33	58	
6	**72**	2 " 6 × 1 " 6	2 " 7	1 " 2	26	14	46	
6	**72**	3 " 6 × 3 " 0	6 " 0	3 " 0	42	29	60	
6	**72**	4 " 0 × 2 " 0	5 " 6	2 " 0	36	34	56	
6	**72**	4 " 6 × 3 " 0	5 " 6	3 " 0	48	48	66	
6	**72**	5 " 6 × 2 " 6	6 " 0	3 " 0	51	58	68	
6	**72**	6 " 3 × 2 " 0	6 " 0	3 " 6	76	47	86	
6	**72**	6 " 6 × 3 " 0	7 " 6	3 " 6	88	78	96	
6	**72**	6 " 6 × 3 " 0	9 " 6	2 " 6	86	75	93	
7	**98**	4 " 0 × 2 " 0	5 " 6	1 " 9	42	35	60	
7	**98**	4 " 0 × 2 " 3	7 " 0	2 " 6	64	38	83	
7	**98**	6 " 6 × 4 " 0	7 " 0	4 " 6	96	90	108	

TABLE OF PACKING PRESSES (Continued.)

Diam. of Ram	Power of Press at 2 tons per circ. inch	Size of Table	Height Table to Head	Rise of Ram	Approx. weight of Press	Approximate dimensions of Press packed	Price of Press without Pumps	PUMPS
Inches	Tons	Ft. Ins. Ft. Ins.	Ft. Ins.	Ft. Ins.	Cwt.	Cubic Feet	£	
8	128	2 " 0 × 2 " 0	4 " 0	1 " 8	45	22	75	
8	128	4 " 6 × 2 " 6	7 " 0	3 " 0	85	53	102	Most of the smaller sizes can be provided with Pump of Class A attached to bed of Press which serves as cistern, as shown on page 35, add ... ... £ 7 10 0
8	128	5 " 0 × 2 " 6	6 " 6	4 " 6	108	65	124	
8	128	5 " 0 × 3 " 0	5 " 0	3 " 0	86	63	105	
8	128	5 " 6 × 2 " 6	7 " 6	3 " 3	85	62	105	
8	128	6 " 0 × 3 " 0	8 " 0	4 " 0	95	80	110	Many of the larger sizes can be provided with 2 Pumps, 2 and 1 in., of Class B attached to bed of Press which serves as cistern, as shown on page 19 ... ... £20 0 0
9	160	4 " 6 × 3 " 0	6 " 0	2 " 0	105	62	125	
9	160	6 " 6 × 3 " 0	8 " 0	3 " 0	126	84	135	
9	160	8 " 0 × 4 " 6	8 " 0	3 " 6	148	120	160	
10	200	2 " 10 × 2 " 10	4 " 9	2 " 0	75	52	104	If with 1 Pump Class B on strong separate cistern, add... ... ... £15 0 0
10	200	3 " 4 × 3 " 4	6 " 0	2 " 6	84	62	114	
10	200	3 " 9 × 2 " 9	7 " 0	2 " 0	82	55	110	
10	200	4 " 0 × 4 " 0	6 " 0	3 " 0	88	72	118	If with 2 Pumps Class B, 2 & 1 in., on strong separate cistern, add £25 0 0
10	200	4 " 2 × 3 " 4	7 " 0	3 " 0	86	71	116	
10	200	4 " 6 × 3 " 0	6 " 0	2 " 0	118	96	138	If with 2 Pumps Class C, 2 & 1 in., on strong separate cistern, add £25 0 0
10	200	6 " 0 × 3 " 0	8 " 0	3 " 6	130	89	150	
10	200	7 " 6 × 3 " 6	9 " 0	4 " 6	165	121	180	
10	200	8 " 0 × 4 " 6	6 " 9	3 " 6	163	130	172	For Steam Moved Pumps, &c., see Catalogue of Pumps.
12	288	4 " 0 × 4 " 0	6 " 0	3 " 0	117	100	150	
12	288	6 " 0 × 3 " 6	6 " 0	4 " 6	188	120	200	
14	390	6 " 0 × 3 " 6	6 " 0	4 " 6	218	125	230	
16	500	6 " 0 × 3 " 6	6 " 0	4 " 6	275	128	285	

HYDRAULIC PRESSES, WITH INVERTED CYLINDERS.



HYDRAULIC PRESSES, WITH INVERTED CYLINDERS.

In some cases it is not convenient to have the cylinder of the press below the surface of the floor, and in other cases it is desirable to have the pressure exerted *downwards* instead of *upwards*, as is usually the case with Hydraulic Presses. Under these circumstances presses are arranged as in the annexed engraving. The follower is counterbalanced so as to run up of itself when the pressure is released. The press shown is one of large size, for cloth pressing, packing or baling hides; but we can arrange presses of any size in this manner. We also arrange presses to work horizontally when this position is more convenient. *(See Illustration of Stearine Press, page 54.)*

All these presses are made with wrought-iron pillars, of great strength, turned bright, and with solid ends forged on, or strong nuts screwed to the ends.

The press is shown without pumps, as these differ according to circumstances. The various forms of pumps will be found fully described further on. *(See Catalogue of Hydraulic Press Pumps.)*

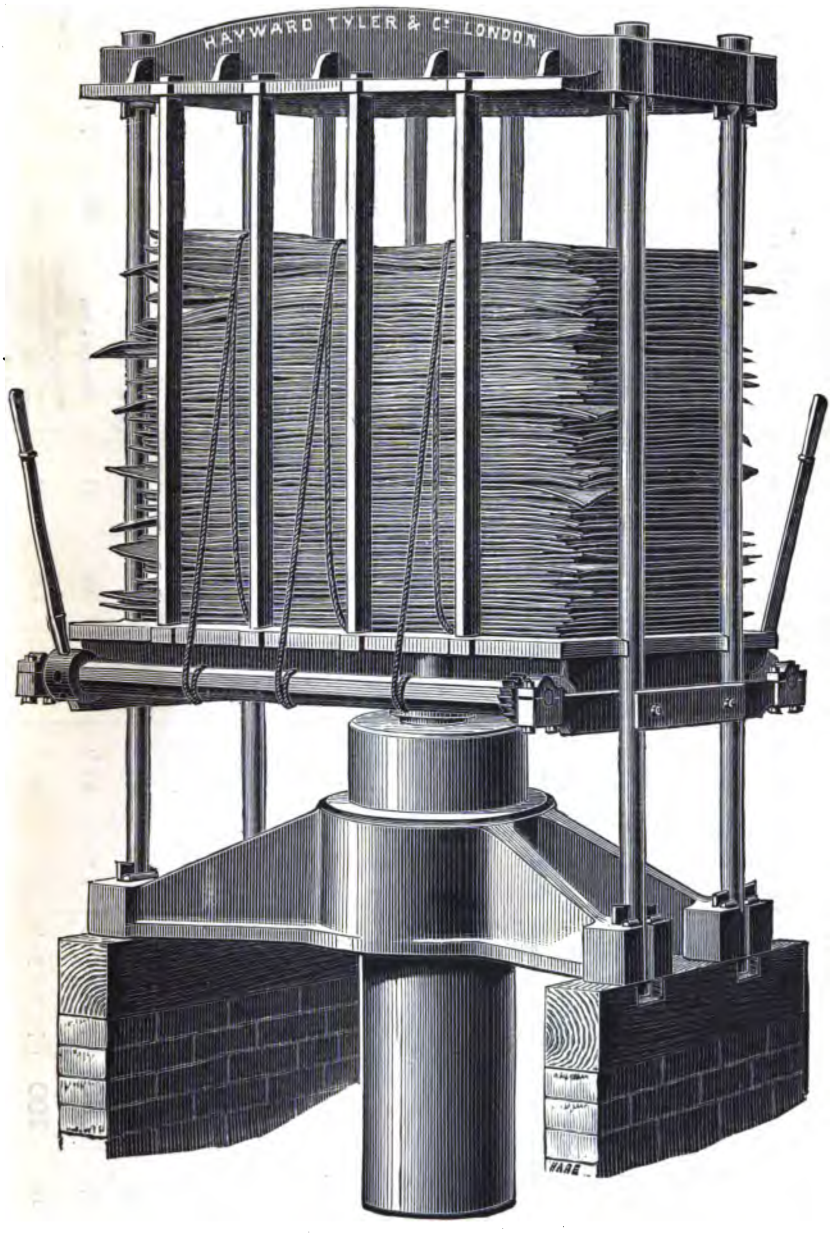
Prices include free delivery at Rail or Docks in London. Packing for Export amounts to about 2 to 4 per cent.

The press shown in engraving is a 10 inch press, power 200 tons, with table 8 ft. x 4 ft. Distance from follower to bed, 9 ft. Run out of ram, 5 ft.

Approx. weight.	Approx. cubic contents when packed.	Price.	Pumps.
412 cwt.	180 Cubic feet	£370	See list of Pumps

Particulars of other sizes can be given if required.

HYDRAULIC PRESSES, ESPECIALLY ADAPTED FOR PACKING RAW HIDES INTO BALES.



HYDRAULIC PRESSES,

ESPECIALLY ADAPTED FOR PACKING RAW HIDES INTO BALES.

These presses have tables of large area, and are provided with several loose bars at the back and front to steady the pile of hides while pressing, These bars can be arranged in any way most convenient for easy removal, as for instance, being hinged at top or bottom and secured at the other end by pins. The arrangement shown in the engraving is the simplest, and therefore preferred by many. The bars pass through holes in the press head and drop into sockets in the follower, thus rising with the follower. The presses can, if desired, be provided with the winding rollers, ratchet wheels and handspikes, as shown, for tightening the ropes over the bales. This much facilitates the process of packing. They can also be provided with ribbed plattens of hard wood, but this is not generally necessary.

All these presses are made with wrought-iron pillars, of great strength, turned bright, and with solid ends forged on, or strong nuts screwed to the ends.

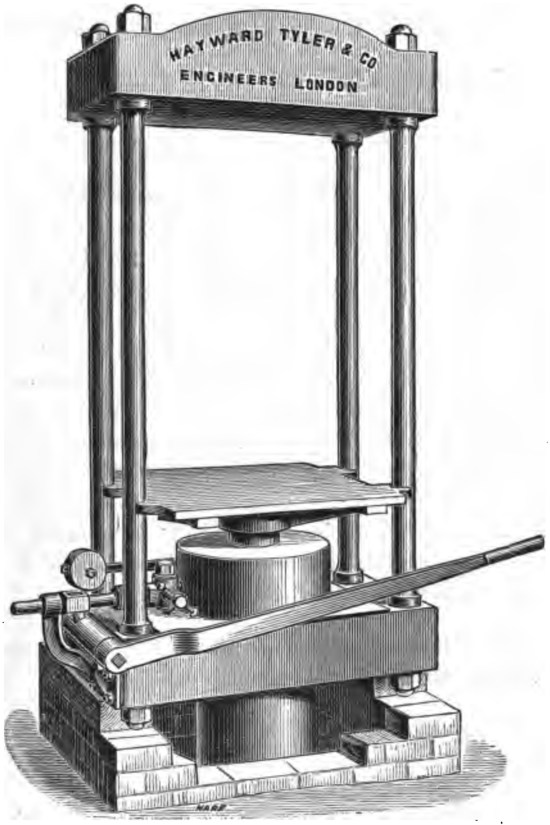
The press is shown without pumps, as these differ according to circumstances. The various forms of pumps will be found fully described further on. *(See Catalogue of Hydraulic Press Pumps.)*

Prices include free delivery at Rail or Docks in London. Packing for Export amounts to about 2 to 4 per cent.

The following are the sizes generally required, but other proportions may be needed for special cases.

Diam. of Ram.	Power of Press at 2 tons per circ. inch.	Size of Table.	Height from Table to Head.	Rise of Table.	No. of steadying Bars at back and front.	Approx. weight of Press.	Approx. dimens. when packed.	REMARKS.	Price of Press	Extra for tightening gear.	PUMPS
Inches	Tons	Ft. Ins. Ft. Ins.	Ft. Ins.	Ft. Ins.	No.	Cwt.	Cub. Ft.		£	£ s.	
6	**72**	4 " 6 × 3 " 0	5 " 0	3 " 0	1	50	50	Sheepskins.	70	7 10	Single Pump Class A, attached to Press ... £ 7 10 0
6	**72**	5" 3 × 2 " 6	6 " 0	4 " 6	2	56	54	Sheepskins and small Hides.	78	7 10	Single Pump Class B, attached to Press ... £12 0 0
7	**98**	4 " 0 × 2 " 3	7 " 0	4 " 6	2	62	51	Sheepskins.	88	7 10	Double Pumps, 2 in. & 1 in., Class B £25 0 0
10	**200**	7 " 6 × 3 " 6	9 " 0	4 " 6	4	198	132	HIDES.—A bale of Bombay hides measure 7ft. × 3ft. × 2ft. and weighs 17cwt.	200	10 0	Double Pumps, 2 in, & 1 in., Class C £38 0 0
10	**200**	8 " 0 × 3 " 6	7 " 0	4 " 6	4	200	146	Hides.	·205	10 0	For other Pumps see list of pumps

HYDRAULIC PRESSES,



OF VARIOUS SIZES, AND ADAPTED TO DIFFERENT PURPOSES, WITH HORIZONTAL PUMP ATTACHED DIRECT TO THE PRESS THE BED OF WHICH SERVES AS CISTERN.

HYDRAULIC PRESSES,

OF VARIOUS SIZES, AND ADAPTED TO DIFFERENT PURPOSES, WITH HORIZONTAL PUMP ATTACHED DIRECT TO THE PRESS, THE BED OF WHICH SERVES AS CISTERN.

For some purposes and especially where it is desirable to save room in packing, and to work in the smallest possible compass, it has been found an advantage to use the bed of the press as a cistern, and to attach the pumps direct to the cylinders of the press, dispensing entirely with the connecting pipes and their accompanying junctions. It is, however, of the highest importance for the permanent working of the machine that the pump which is thus placed should be constructed on the same principles as have been found to give the best results in separate pumps; especially that the valves should be of proper design and of sufficient size, thoroughly ground into their seats, and that the plunger of the pump should be properly packed with an efficient cup leather. The pump shown in the Engraving is thus constructed, and is provided with safety valve, and relief valve, of thoroughly good design. Owing to the saving of material and workmanship as compared with separate pumps it will be seen that the price is considerably less.

These pumps can be applied to a great number of our presses, but the following are some of those for which they are best adapted.

Diam. of Ram	Power of Press	Size of Table	Height from Table to Head	Rise of Ram	Approx. weight	Price of press & one Pump
Inches	Tons	Ft. In. Ft. In.	Ft. In.	Inches	Cwt.	£
3	15	2 ″ 0 × 1 ″ 10	2 ″ 8	14	9	32
4	25	2 ″ 0 × 1 ″ 10	2 ″ 8	14	20	45
4	25	2 ″ 6 × 1 ″ 6	3 ″ 0	15	22	52
5	40	2 ″ 0 × 1 ″ 10	2 ″ 10	15	22	55
5	40	2 ″ 4 × 1 ″ 7	3 ″ 0	16	28	55
5	40	2 ″ 6 × 2 ″ 0	3 ″ 4	16	35	60
6	60	1 ″ 9 × 1 ″ 5	2 ″ 6	14	25	50
6	60	2 ″ 6 × 1 ″ 6	2 ″ 6	14	28	55
8	100	2 ″ 0 × 2 ″ 0	4 ″ 0	20	44	70

HYDRAULIC PRESSES, FOR EXTRACTING TINCTURES, OILS, &c.,

AND SIMILAR MANUFACTURING PURPOSES.

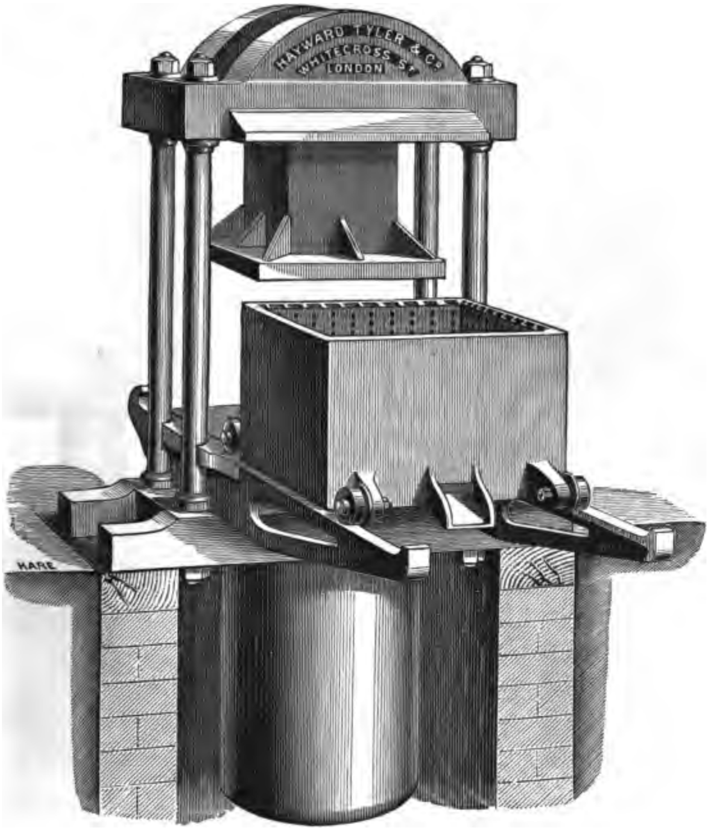


Fig. X.

There are two ways in which Tinctures, &c., may be extracted in the Hydraulic Press, namely, by piling the materials to be pressed on the table of the press in bags, with plates between, or by placing the material in a box, in layers, with plates between; the box being provided with perforated plates at the sides and bottom, behind which perforations are grooves by which the liquor runs down and out at the spout of the box.

The presses shown can be used for either purpose, and in that case a loose tray with a spout is provided to go on the follower of the press when the box is removed. The illustrations show several arrangements for working the boxes, according to the convenience of the user.

In Fig. X the mullet is fixed to the head of the press, and the box runs in and out on cast-iron rails which are attached to the pillars of the press, forming a portion of the machine. This is a very convenient plan as it leaves the box entirely accessible for filling and emptying.

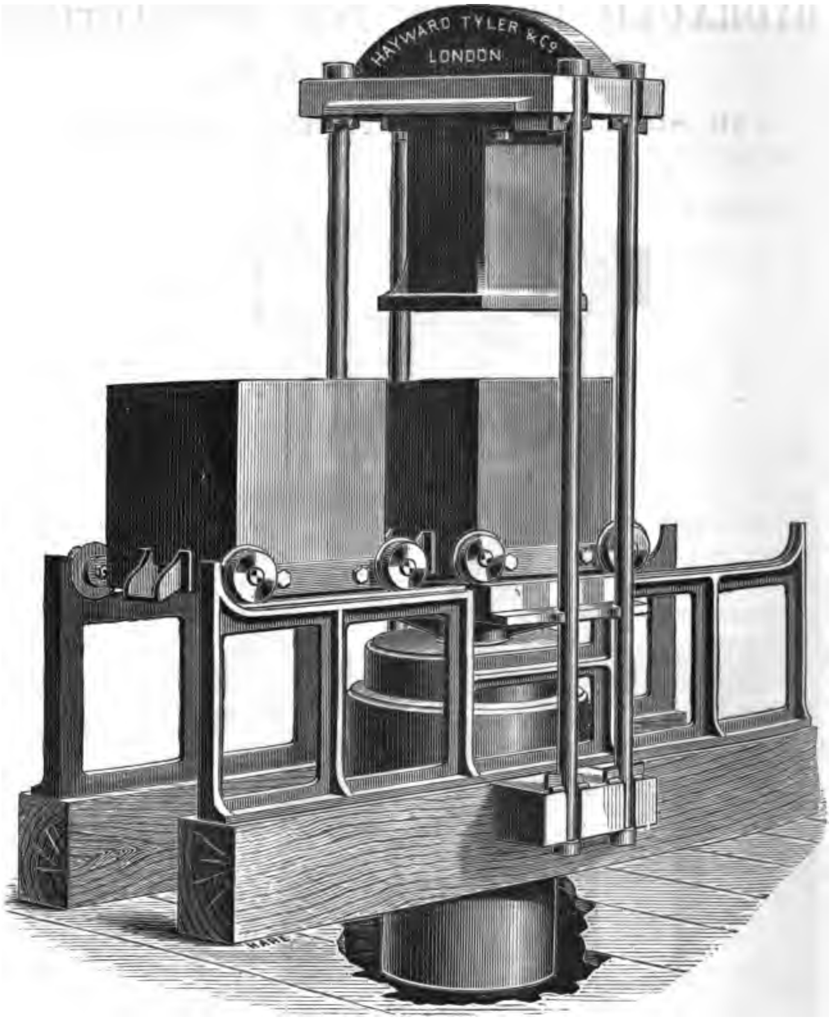


Fig. Y.

In Fig. Y, another arrangement of the same system is shown. In this, two boxes are used alternately, and they run out at opposite sides of the press on a frame work made of cast-iron, which is placed so as to bring the boxes at a convenient height from the floor. This is a convenient arrangement if the boxes are required to have loose bottoms and to be emptied from below.

In Fig. Z the plan adopted is somewhat different; the box remaining on the rising table of the press, while the mullet is moved out of the way by means of wheels running in suitable brackets attached to the head of the press.

In this Engraving the press is shown mounted on cast-iron frames or standards, so that no part comes below the level of the floor. It will be readily understood, that a press in which the box is arranged as Fig. X, can be placed upon standards in precisely the same manner. In the larger sizes, the boxes run out on rails laid on the floor, the cylinder being sunk in the ground.

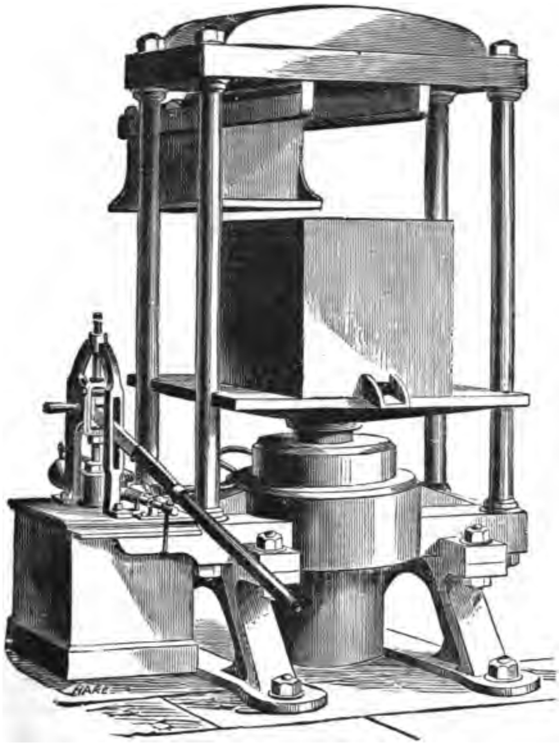


Fig. Z.

Any of these presses can be made with the pumps attached to the bed, which also serves as cistern, (Class A), as shown in Engraving page 35, or can be worked by separate pumps of various descriptions, for which, see Catalogue of Press Pumps.

The Boxes are made of various materials according to the substances to be pressed in them. For many purposes a cast-iron box, galvanized, (coated with zinc), is the most useful; the perforated lining plates may be either of galvanized iron or of copper. In other cases it is needful to use a box of solid gun-metal with copper lining plates, and sometimes it is found that nothing will answer but wood, in which case the box is made very strongly of hard wood, (oak or American birch), and the lining plates are also of wood. In presses for grapes and for cider the box is made thus. The loose tray for pressing tinctures in bags without box, may be made of iron, wood, or copper. These trays are not included in any prices given.

For further information as to this mode of pressing, the reader is referred to the descriptions of *Oil Presses* further on.

All these presses are made with wrought-iron pillars, of great strength, turned bright, and with solid ends forged on, or strong nuts screwed to the ends.

TINCTURE PRESSES.

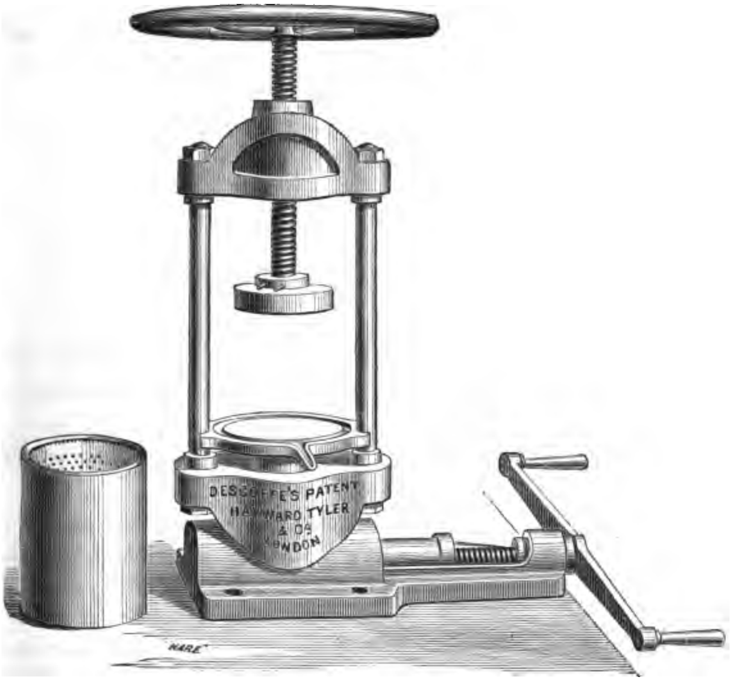
The following are some of the most convenient sizes of Presses for Tinctures, &c. The prices are, in all cases, for galvanized cast-iron boxes lined with galvanized sheet iron, unless otherwise specified. Gun-metal boxes or wooden boxes at special prices.

Diam. of Ram	Power of Press at Two Tons per circ. inch	Size of Table	Size of Box, in inches, inside measure	Height of Press from Table to Head	Rise of Ram	Approx. weight of Press and Box as Fig. X	Approx. diam. packed in cubic feet	PRICES OF PRESS AND BOX, WITH RAILS, BUT WITHOUT PUMP: As Fig. X	As Fig. Y with one box	As Fig. Z	Single Pump Class A attached to Press	Single Pump Class B on strong Cistern	Double Pump Class B on strong Cistern
Inches	Tons	Ft. In. Ft. In.		Ft. In.	Inches	Cwt.	Ft. In.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
3	18	2 " 0 × 1 " 10	14 × 14 × 14	2 " 8	14	13	15	35 0 0	38 10 0	37 0 0	7 10 0	15 0 0	25 0 0
4	32	2 " 0 × 1 " 10	14 × 14 × 14	2 " 8	14	25	16	42 0 0	46 0 0	44 0 6			
4	32	2 " 6 × 1 " 6	18 × 18 × 15	2 " 11	14	30	21	50 0 0	55 0 0	52 0 0			
5	50	1 " 10 × 1 " 10	14 × 14 × 14	2 " 10	12	26	19	48 0 0	53 0 0	50 10 0			
5	50	2 " 0 × 1 " 5	14 × 14 × 14	2 " 8	14	28	15	48 0 0	53 0 0	50 10 0			
5	50	2 " 0 × 1 " 10	15 × 15 × 15	2 " 10	14	29	16	50 0 0	55 0 0	52 10 0			
5	50	2 " 4 × 1 " 7	16 × 16 × 16	2 " 11	16	34	20	52 0 0	57 0 0	54 10 0			
5	50	2 " 6 × 1 " 6	18 × 18 × 15	2 " 8	14	40	22	58 0 0	63 0 0	61 0 0			
*5	50	2 " 6 × 2 " 0	20 × 20 × 23	3 " 4	12	45	24	65 0 0	70 0 0	68 0 0			
6	72	1 " 9 × 1 " 5	14 × 14 × 14	2 " 6	14	28	15	52 0 0	57 0 0	55 0 0			
6	72	2 " 6 × 1 " 6	18 × 18 × 15	2 " 7	14	32	22	58 0 0	63 10 0	61 0 0			
6	72	2 " 4 × 1 " 10	24 × 18 × 16	3 " 0	15	36	24	62 0 0	67 10 0	65 0 0			
8	128	2 " 4 × 2 " 0	33 × 20 × 22	4 " 0	20	75	48	100 0 0					
10	200	2 " 8 × 2 " 8	22 × 22 × 30	4 " 9	26	105	70	135 0 0					
10	200	2 " 10 × 2 " 10	28 × 28 × 30	4 " 9	24	110	61	140 0 0					
11	240	2 " 10 × 2 " 10	28 × 28 × 30	4 " 9	24	114	62	150 0 0					
5	50	1 " 10 × 1 " 3	For bags only	4 " 0	24	25	10	45 0 0					
6	72	1 " 10 × 1 " 3	" "	4 " 0	24	30	15	52 0 0					

* This press is specially adapted for pressing Grapes or Cider with a wooden box.

DESGOFFE'S PATENT COMPOUND SCREW AND HYDRAULIC PRESSES.

(OTHERWISE CALLED "STER-HYDRAULIC" PRESSES.)



No. 1.

These presses are especially adapted for laboratories, small chemical factories, the use of druggists and dentists, and for experimental purposes.

They are a combination of the principles of the Screw and the Hydraulic Press on a new and ingenious system. Instead of the water being pumped into the press cylinder by a pump working intermittently, the pump is replaced by a piston or ram of small diameter, but of such length that its volume is equal to that of the press ram. This small piston is forced into the ram-chamber by means of a screw, and thereby a threefold mechanical power is employed to increase the power applied, namely, the leverage of the handle, the power of the screw, and the force due to the hydraulic pressure. In this way, with one of the smallest presses, a man working the handle can easily apply a power of ten tons. In the larger sizes the screw may be worked by steam, and this gives the advantage of *an entirely continuous motion* which is not possessed by any form of press pump.

The presses are arranged as shewn in the engravings, with round followers which are provided with a groove and spout for collecting the liquor. The press can be used with a pile of bags or with a tincture box. The latter is made of strong galvanized iron, and double, the inside being perforated with holes to allow the escape of the liquor.

To increase the speed of working, the head of the press is provided with a follower worked by a screw; by means of this the first pressure is applied and the material compressed as much as possible before the hydraulic pressure is brought to bear.

No.	Power of Press	Capacity of Cylinders	Approximate weight of Press			Approximate dimensions packed	Price		
	Tons		cwt.	qrs.	lbs.	cubic feet	£	s.	d.
1	10	3 qts.	1	3	0	5	14	10	0
2	20	2½ galls.	4	0	0	7½	21	15	0
3	30	6 galls.	7	0	0	15	33	15	0
4	50	20 galls.	17	0	0	40	To work by hand, £68		
4	50	20 galls.					To work by power £88		

No. 5. Larger Press, for power, complete with Pressure Gauge, &c. (*see page* 44.) Prices on application.

NOTE.—With small presses such as these it is a good plan to work with *oil* instead of water in the cylinder; there is no danger of freezing, and the oil keeps all internal parts lubricated and free from rust. In filling the cylinder by means of the screw at the side, care must be taken to get rid of all the *air*.

The annexed letter received while this Work was in the Printer's hands, is inserted as showing the practical value of these Presses.

GENTLEMEN,

I am glad to inform you that I am very much pleased indeed with the 4 gallon 20 ton Tincture Press you sold me recently. It works most admirably, and I consider it very compact, convenient, and ornamental.

In subjecting to the ordinary press the concentrated tinctures I made, in which a large quantity of spirit was absorbed by the material subjected to maceration, I lost about one-third of the liquid, which I was unable to obtain from the residue; but by the use of your press I now scarcely lose one-seventh, which is an enormous difference to the loss I previously sustained. It is a decided saving, that will soon recoup the entire cost of the press.

By not quite filling the press the results are more satisfactory. I lose 18¾ fluid ounces or rather less than ¼ out of a gallon of liquid from your press whereas I lost with the Tincture Press I previously used about 55 fluid ounces in the gallon which remained in the mass.

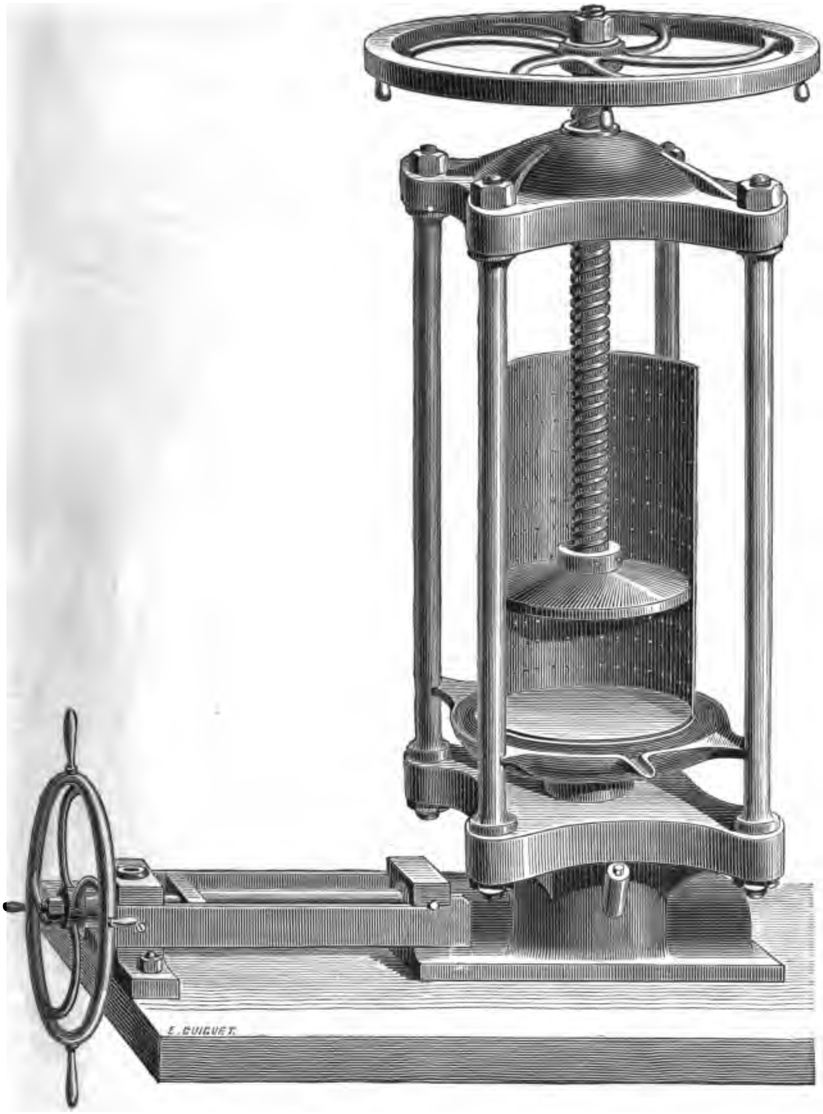
I am very much pleased with the result.

I am, Gentlemen,

Yours faithfully,

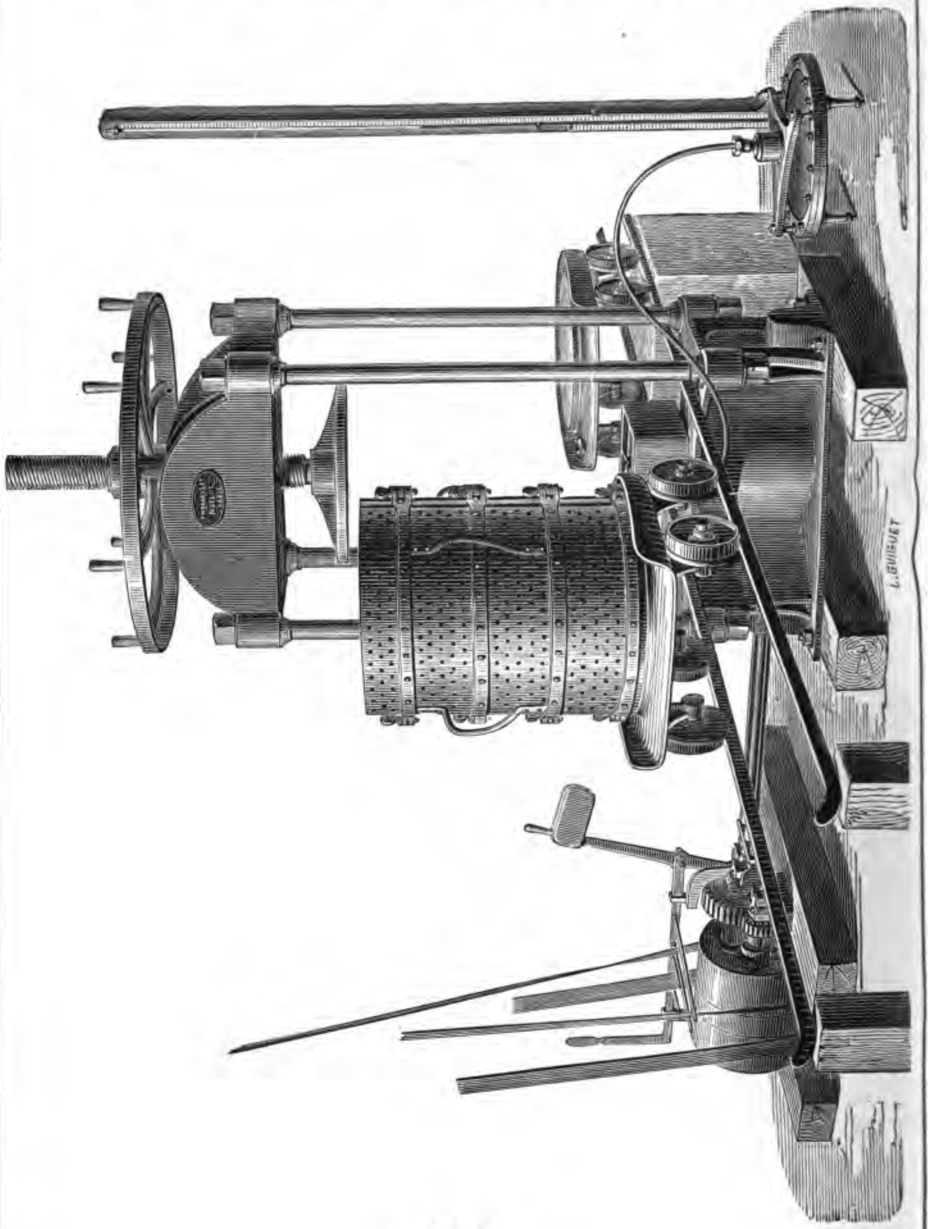
W. HAY.

DESGOFFE'S PATENT COMPOUND SCREW AND HYDRAULIC PRESSES.



No. 4, or 50 ton Press, for Hand Power.

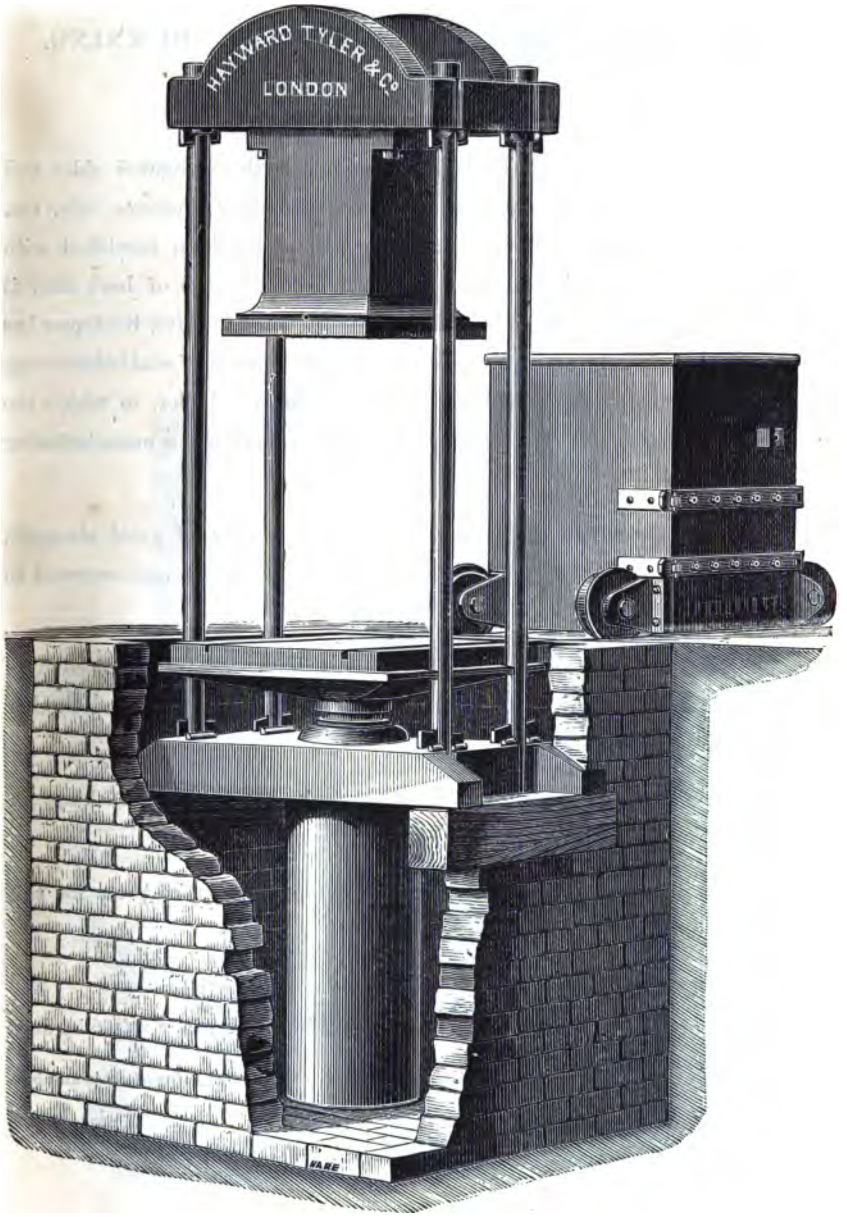
DESGOFFE'S PATENT
COMPOUND SCREW & HYDRAULIC PRESS,
FOR WORKING BY STEAM POWER.



No. 5.

HYDRAULIC PRESSES,

FOR EXTRACTING THE LIQUOR FROM TANNERS' BARK, AND COMPRESSING THE BARK INTO MATERIAL FOR BURNING.



HYDRAULIC PRESSES,

FOR EXTRACTING THE LIQUOR FROM TANNERS' BARK AND COMPRESSING THE BARK INTO MATERIAL FOR BURNING.

These presses are made with a cast-iron box with corrugated sides and bottom somewhat similar to those used for extracting tinctures, oils, etc. The box is provided with a door at the lower half of its sides, furnished with strong wrought-iron hinges and bars for extracting the charge of bark after it is pressed. The box runs in and out of the press on wheels. After the liquor has been extracted, the refuse bark is mixed with a small quantity of coal before using it as fuel. A receptacle is made in the flue behind the boiler, in which the "tan ash" collects; this "tan ash" is of considerable value for manufacturing purposes.

All these presses are made with wrought-iron pillars, of great strength, turned bright, and with solid ends forged on, or strong nuts screwed to the ends.

The press is shewn without pumps, as these differ according to circumstances. The various forms of pumps will be found fully described further on, in *Catalogue of Press Pumps.*

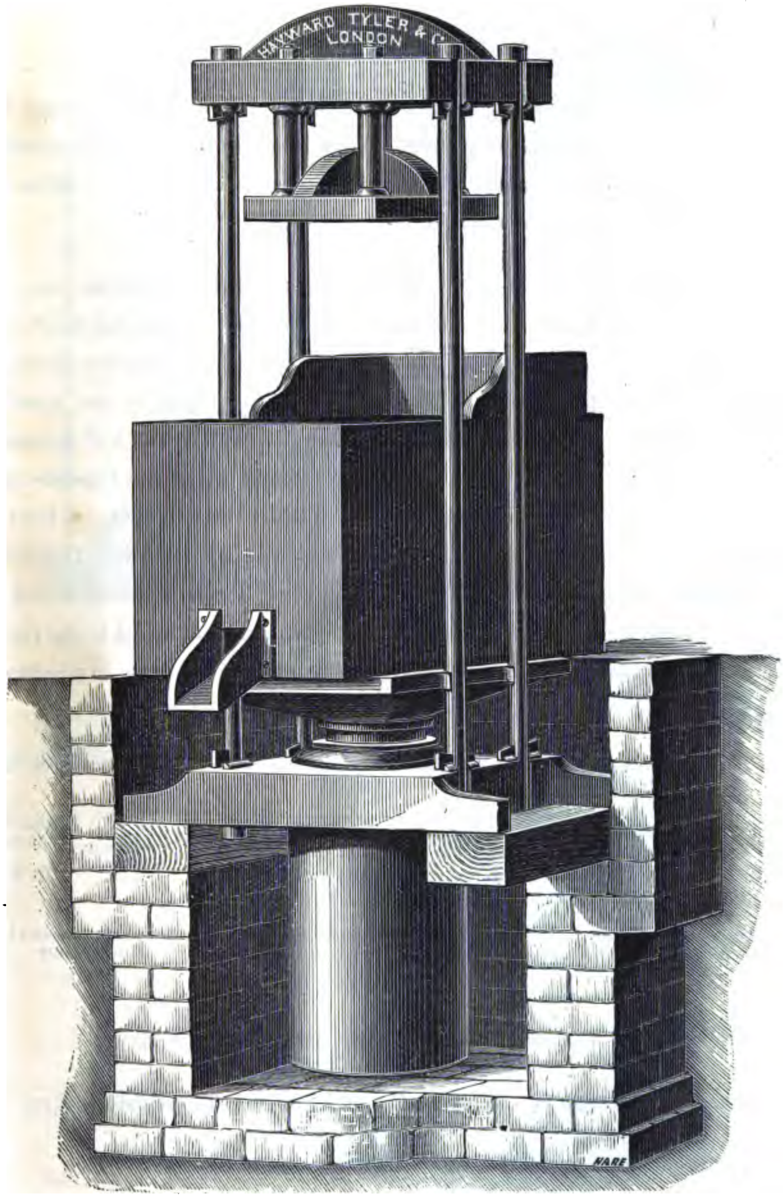
Prices include free delivery at Rail or Docks in London. Packing for Export amounts to about 3 per cent.

The following are the most usual forms and proportions of press for this purpose.

Diam. of Ram	Power of Press	Table	Box
10 ins.	200 tons	2 ft. 10 in. × 2 ft. 6 in.	2 ft. 2 in. × 2 ft. 2 in. 2 × ft. 6 in. deep

Table to head	Rise of ram	Approx. weight of press and box	Approx. dimensions	Price of press and box
4 ft. 8 in.	1 ft. 8 in.	102 cwt.	78 cub. ft.	£132

HYDRAULIC PRESSES, FOR EXTRACTING THE TALLOW FROM GREAVES.



HYDRAULIC PRESSES, FOR EXTRACTING THE TALLOW FROM GREAVES.

Presses in this form are used by the large tallow boiling houses for separating the tallow from the greaves. They are also of great use to colonists in Australia and other countries where sheep are plentiful and where tallow is an important article of commerce.

The process employed is generally as follows: the fat and meat, etc., are first boiled or stewed until all the tallow which will rise has been taken off; the material is then placed while hot in layers in the strong cast-iron box shown in the engraving, and pressure is applied. The tallow escapes by the spout in front, and the greaves are compressed into the solid flat cakes so well known in commerce. The front and bottom plates of the lining are jointed together, and the former is provided with holes by which it is lifted out by means of a lever of suitable shape (which we supply) bringing up the charge with it. This is the plan generally adopted in the best factories, but it is sometimes preferred to have hooks suspended from the head of press, which are attached to the plates and so lift them out as the box is lowered. We can fit the press in whichever way is preferred: the prices are for the former plan.

The following are the dimensions of the presses which are generally in use.

Diam. of ram	Power of press	Box	Height, table to head	Rise of ram
8 ft.	120 to 160 tons	2 ft. 10 in. × 1 ft. 8 in. × 1 ft. 10 in.	4 ft.	1 ft. 8 in.

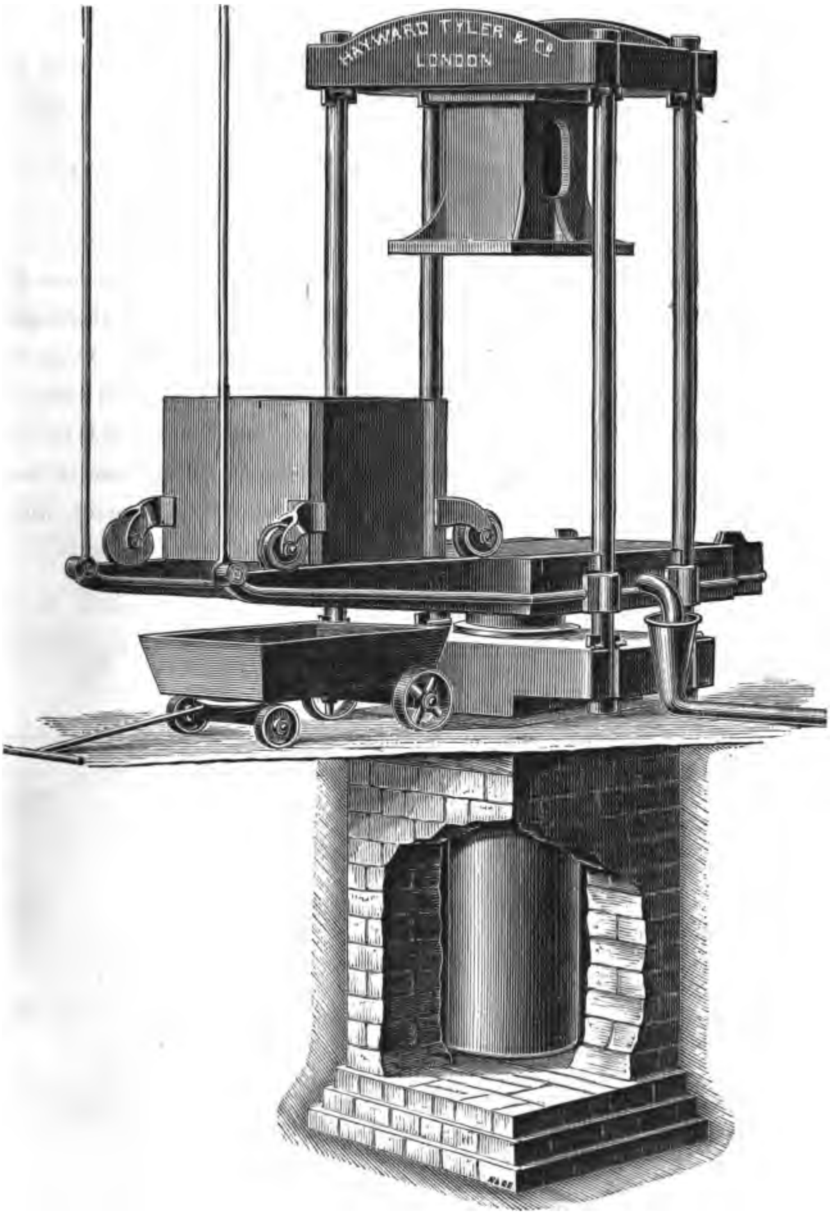
Approx. weight of press and box	Approx. dimensions of press and box packed	Price of press and box no pumps
75 cwt.	48 cubic feet.	£100

Price of press with one pump, fig. B, on separate cistern, £115

Price of press with two pumps, 2 ins. and 1 in., fig. B, on cistern, £125

For steam moved pumps &c., see pump catalogue.

HYDRAULIC PRESSES, FOR PRESSING HOPS; FOR THE USE OF BREWERS.



HYDRAULIC PRESSES FOR PRESSING HOPS; FOR THE USE OF BREWERS.

Various forms of Presses have been designed for extracting the wort which remains in the hops after boiling, but none has been found in practice so thoroughly efficient as the press which we have made, as represented in the annexed engraving, for some of the first Brewers in the world.

The hops are thrown into a wooden box lined with perforated copper and with a loose bottom. This box runs on and off the follower of the Press on rails, which are supported at one end on the pillars of the press, and at the other end suspended from the roof. The wort is collected by a flexible pipe from the follower during the process of pressing. When the hops are thoroughly pressed the box is run out of the Press over a trolley, into which the spent hops are forced out (when the loose bottom of the box is removed) and are wheeled away at once. These Presses may be worked by any form of hydraulic pump, but are especially recommended for use in connection with our Patent Accumulator Steam Pumps (description of which see in *Catalogue of Press Pumps*).

Two of the presses made as above, and with the Accumulator Steam Pumps, are found in practice to do the work of three presses of the ordinary make.

The following are the general dimensions of the Hop Presses most approved of in practice.

Diam. of Ram.	Power	Size of Table	Size of Box
14 ins. to work at 1 ton per circ. inch	200 tons	4 ft. 3in. × 4 ft. 0 in.	3 ft. 1in. × 2 ft. 2 in. × 2 ft. 3 in.
10 ins. to work at 2 tons per circ. inch	200 tons	4 ft. 3in. × 4 ft. 0 in.	3 ft. 1 in. × 2 ft. 2 in. × 2 ft. 3 in.

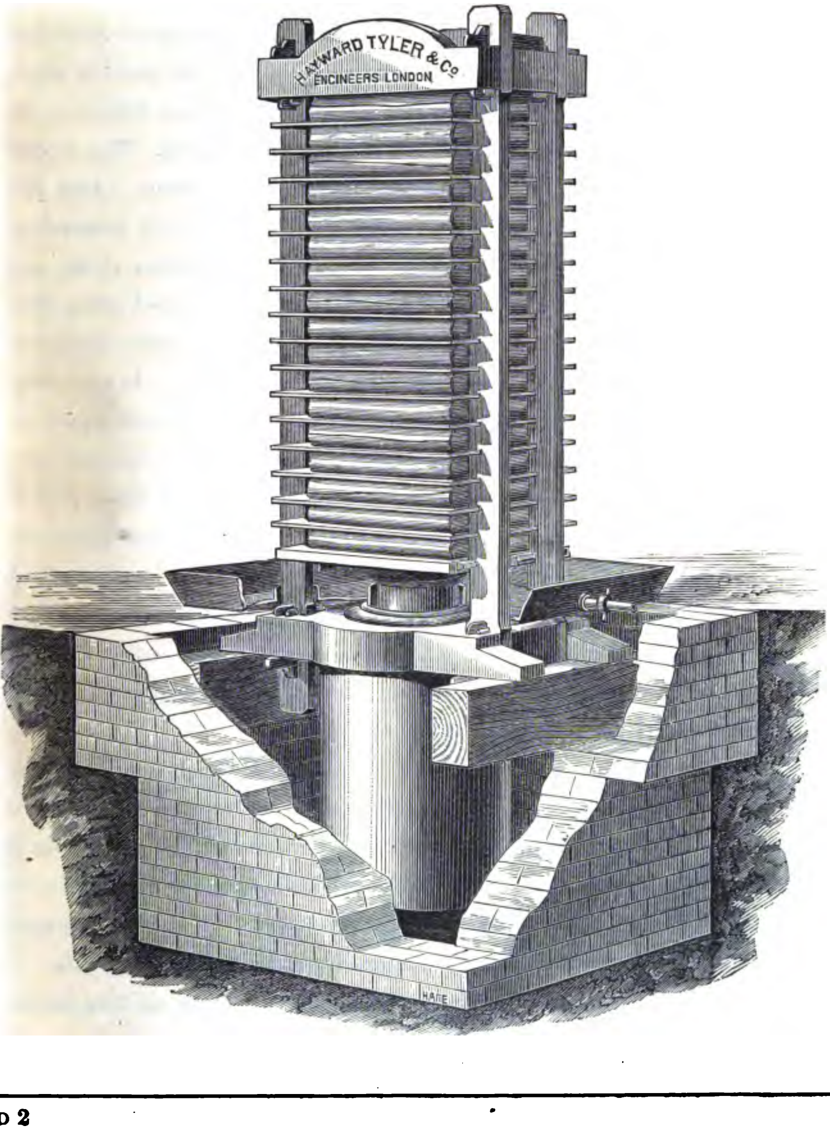
Height from Table to Head	Rise of Ram	Approx. weight of press	Approx. dimen. of press & box	Price of press and box	Price of patent accumulator Steam pump
6 ft. 6 in.	4 ft. 6 in.	8 tons 15 cwt.	161 c. ft.		
6 ft. 6 in.	4 ft. 6 in.	8 tons 15 cwt.	152 c. ft.		

Smaller sizes, suited for smaller Breweries, if required.

HYDRAULIC PRESSES,

USED IN THE MANUFACTURE OF STEARINE;

ALSO, FOR EXTRACTING OIL FROM COCOA-NUT, OLIVES, LARD, &c., AND FOR PARAFFINE.



HYDRAULIC PRESSES,

USED IN THE MANUFACTURE OF STEARINE; ALSO, FOR EXTRACTING OIL FROM COCOA-NUT, OLIVES, LARD, &C., AND FOR PARAFFINE.

Two classes of presses are used in the manufacture of Stearine—the cold press and the hot press.

After the preliminary processes of Saponification, &c., the tallow is poured into tin moulds, to form cakes for pressing; these cakes are generally about 1¼ in. deep, and any length and breadth required.

The cold press is the first used. The cakes are placed between cocoa-nut fibre mats in layers, with an iron plate between each, until the press is filled. Pressure is applied slowly, and the Oleine which is pressed out falls into the iron tray underneath the rising table, and runs off at the spout. This process frequently goes on all day, and the tallow is left at night to drain. After this operation, the material is again melted down and run into cakes preparatory to going into the hot press. The cakes are folded into woollen cloths, and put between horse hair mats. The hot press is generally horizontal, with a press box closed by a wrought-iron cover at the top. This box is fitted with a number of hollow iron loose plates which go between the cakes of stearine. In some cases the sides of the press box are made hollow, of cast-iron, faced with copper, so that the steam may heat them more thoroughly; in other cases, the steam is only admitted into the press box, and among the plates, the sides being packed with sawdust, to make them retain the heat. After the press and plates are thoroughly heated by steam, the cover is opened and a cake of the material placed between each plate, throughout the length of the press box. The pressure is then applied rapidly, and in about half an hour the stearine is produced in its pure, white, semi-transparent state. We also sometimes make the hot presses vertical, with hollow plates, for working in a steam-room.

It is desirable to notice that both the cold and the hot presses here mentioned, are applicable to other processes besides the precise one described above: as, for instance, to the treatment of factory refuse for the extraction of the oil, in the way which has been especially adopted since the prohibition to run this refuse into drains or rivers. It will be found that these hot presses produce much better results than other means for obtaining the same ends.

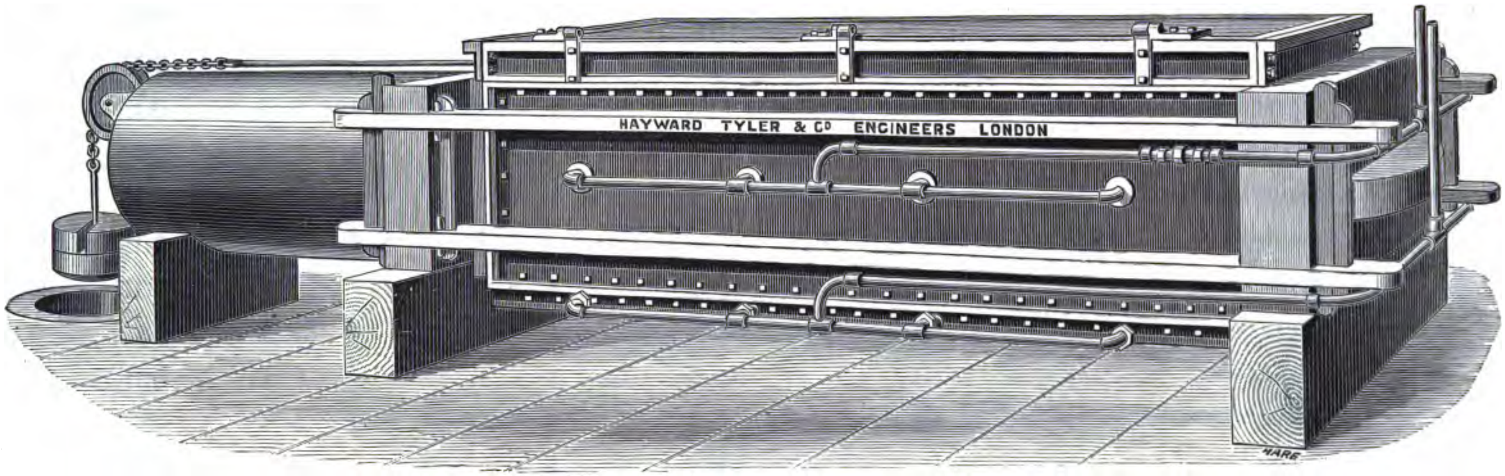
The cold presses are also especially adapted for extracting oil from cocoa-nut, olives, lard, &c., and for treating paraffine, &c.

The annexed Table contains some of the most useful sizes and proportions of Cold Presses for Extracting Oil from Cocoa-Nut, Olives, Lard, &c.; and for treating Stearine, and Paraffin.

Diam. of Ram	Power of press	Size of Table	Table to Head	Rise of Ram	No. of Plates	Approx. weight of press & plates	Approx. dims. of press & plates	Remarks	Price of press and plates.
Inches	Tons	Ft. In. Ft. In.	Ft. In.	Ft. In.		Cwt.	Cub. Feet		£
6	72	4 9 × 2 3	7 " 9	4 " 6	40	82	75	For Lard, &c.	98
6	72	4 0 × 2 0	5 " 0	2 " 6	30	46	47	For Lard	70
8	128	2 6 × 2 0	6 " 0	3 " 0	40	76	47	For Lard	100
8	128	2 6 × 2 6	7 " 0	5 " 6	40	94	56	For Paraffin, charge 10 Cwt	120
9	160	3 3 × 3 3	6 " 0	3 " 0	24	112	73	For Olives	140
10	200	2 3 × 2 3	6 " 0	3 " 0	24	93	52	For Olives and Stearine	125
10	200	2 9 × 2 6	7 " 0	2 " 6	56	105	60	For Cocoa-Nut	135
10	200	3 0 × 2 0	7 " 6	3 " 6	48	115	59	For Stearine	150
10	200	3 3 × 3 3	7 " 6	4 " 6	60	155	105	For Olives or Stearine	180
10	200	4 0 × 2	6 " 0	3 " 0	60	145	116	For Stearine	170
*10	200	2 6 × 1 10	6 " 6	3 " 6	21	135	62	For Stearine	205
12	288	4 9 × 2 7	7 " 6	2 " 9	60	200	143	For Stearine	210
14	390	3 0 × 2 2	8 " 0	3 " 0	70	210	120	For Stearine	230

*The latter Press is used as a Hot-Press by placing it in a steam chamber. The plates are double and ribbed, and the Press is provided with an arrangement for supporting them at proper intervals as the ram is lowered.

HYDRAULIC HOT PRESSES, FOR STEARINE. (See page 52.)

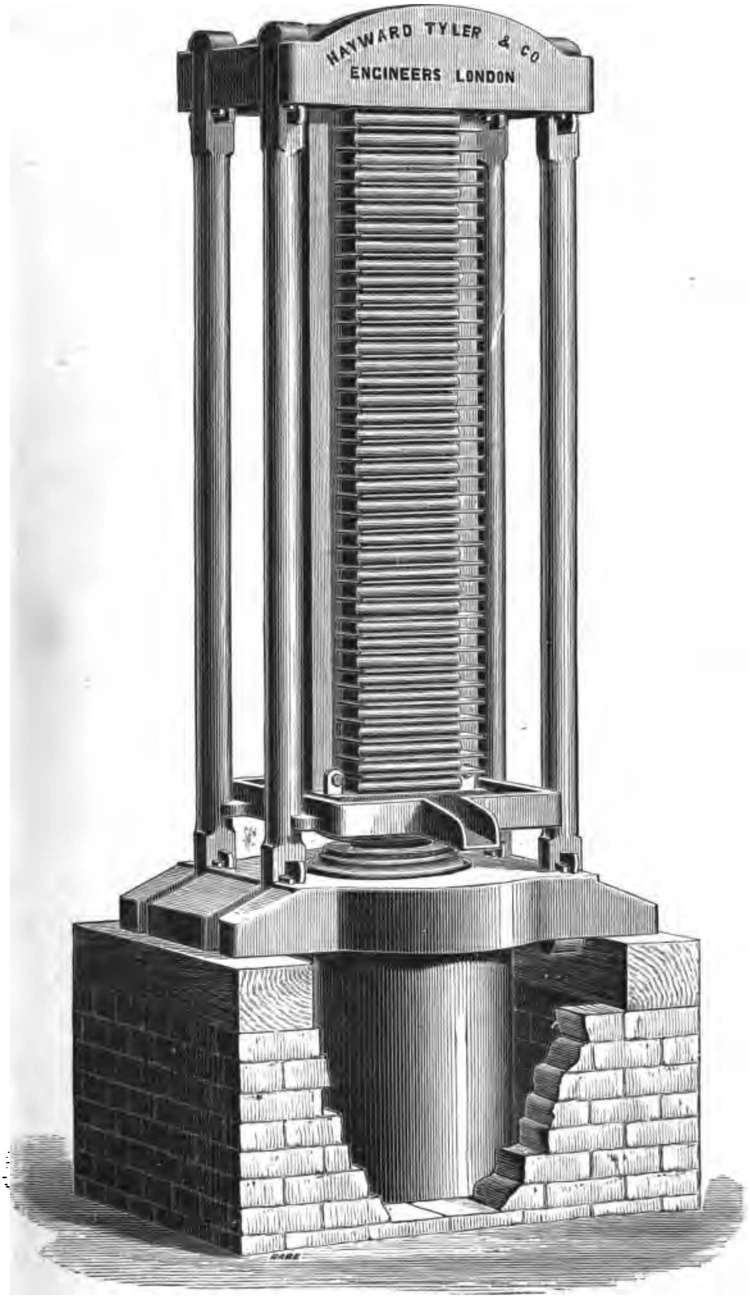

HAYWARD TYLER & Co ENGINEERS LONDON
HARE

The annexed table shows some of the most usual sizes of Hot Presses for Stearine, &c.

Diam. of Ram	Power	Size of Cake	Length of Chamber	Run out of Ram	No. of loose Plates	REMARKS	Approximate Weight	Approximate Dimensions	Price of Press and Plates	Pumps
Ins.	Tons.	Ins. Ins.	Ft. Ins.	Ft. Ins.			Cwt.	Cubic Feet		
8	**128**	24 × 10	5 " 4	2 " 6	20	Sides packed with Sawdust.	100	50		
9	**162**	27 × 11 middle	8 " 0	4 " 6	30	Steam Sides.	130	65		
10	**200**	27 × 15 middle	8 " 0	4 " 6	30	Steam Sides.	145	72		
11	**240**	27 × 16	8 " 0	4 " 6	30	Steam Sides.	153	78		
11	**240**	23 × 23	8 " 0	4 " 6	30	Sides packed with Sawdust.	150	54		
12	**288**	27 × 16	8 " 0	3 " 0	30	Steam Sides.	146	70		

Prices of any of the above or other sizes, on application.

HYDRAULIC PRESSES, OF GREAT POWER, FOR EXTRACTING OIL FROM CASTOR SEEDS, ALMONDS, &c.



HYDRAULIC PRESSES, OF GREAT POWER, FOR EXTRACTING OIL FROM CASTOR SEEDS, ALMONDS, &c.

In extracting the oil from such materials as Castor-seeds and Almonds a very great pressure is required, and, consequently, a comparatively small surface can be acted upon. For this purpose, the material, after having been properly crushed, &c., is folded in cloths of serge and cocoa-nut fibre matting, and piled on the follower with an iron plate between each two bags. The press is made with a groove around the follower, for collecting the oil as it is pressed out; the follower is also provided with two wrought-iron guide-bars, which pass through the head of press and serve to steady the pile of bags while pressing. The same system is also sometimes used for extracting tinctures with the smaller presses.

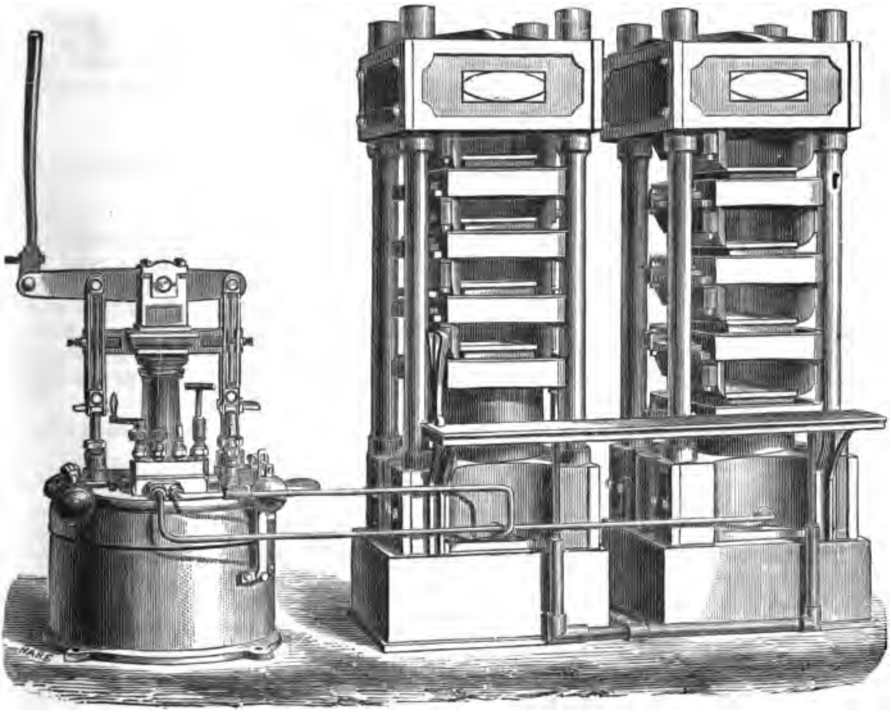
The press is shown without pumps, as these differ according to circumstances. The various forms of pumps will be found fully described further on, in *Catalogue of Press Pumps.*

The annexed are some of the most useful sizes of Hydraulic Presses for Extracting Oil, &c.

Diam. of Ram	Power	Size of Table	Size of Plates	Height Table to Head	Rise of Ram	No. of Plates	Approx. weight with plates	Approx. dim.	Remarks	Price, with plates	Pumps
Inches	Tons	In. In.	In. In.	Ft. In.	Ft. In.		Cwt.	Cub. Feet		£	
5	**50**	22 × 15	18 × 12	4 " 0	2 " 0	16	24	17	Tinctures or Oils	45	Double Pumps, 2 & 1 in., class B ...£25 Do. do. class C ...£38 For Steam-moved Pumps, see Pump Catalogue
8	**128**	26 × 20	16 × 12	6 " 0	2 " 6	60	52	24	Castor Oil—to press 10 gallons in 10 hours by one man	75	
10	**200**	26 × 20	15 × 12	5 " 6	2 " 6	34	68	40	Castor Oil or Almonds	78	
10	**200**	24 × 24	14 × 14	6 " 0	2 " 6	34	69	40	Oil, Seed, &c.	80	
10	**200**	26 × 20	20 × 16	6 " 0	3 " 0	60	99	50	Charge of this press 504 lbs. of ground almonds, 220 lbs. Oil	128	
12	**288**	54 × 48	42 × 36	7 " 0	3 " 0	60	205	113	Castor Oil, &c.	230	
12	**288**	54 × 54	48 × 48	6 " 0	3 " 0	60	228	134	Do.	256	
14	**390**	56 × 36	48 × 30	7 " 0	3 " 0	60	225	136	Stearine, &c., or Castor Oil	255	
14	**390**	54 × 54	48 × 48	6 " 0	3 " 0	60	250	142	Do.	280	

HYDRAULIC PRESSES AND PUMPS,

FOR EXTRACTING OILS FROM FLAX, COTTON, AND OTHER SEEDS.



The engraving represents one pair of 12 inch Hydraulic Presses and a set of Pumps of the best construction. Each press is constructed with four press boxes, adapted for making four cakes of 8 lbs. weight each, and from 11 to 12 lbs. of oil at each pressing.

£300 each.

Set of eight horse-hair mats and sixteen meal-bags per pair of presses.

The 8 inch diameter presses and pumps are of the same design, each press making four cakes of 3 to 3½ lbs. and from 4 to 4½ lbs of oil at each pressing.

£190 each.

Set of eight horse-hair mats and sixteen meal-bags per pair of presses.

OIL MILL PLANT.

FOR EXTRACTING OILS FROM COTTON AND OTHER SEEDS, BY POWER.

We can supply a complete plant in every way adapted to the turning out of from 10 tons and upwards of crushed seed, and a proportionate quantity of oil, according to the seed used, in 24 hours. It includes a strong horizontal engine of first-class workmanship, with fly-wheel and governors, boilers as requisite with the usual steam fittings, best Derbyshire edge runner stones, on stone bed, seed kettles, and crushing rolls with strong hydraulic presses, worked by separate gun-metal plunger pumps, and the necessary receiving and storage tanks, and gearing complete.

Prices on application.

All requisite fittings and accompaniments to the presses and mills supplied.

ESTIMATE NO. 1.

For Plant to work 100 quarters of seed in 24 hours, yielding about 15 tons of cake and 12,000 lbs. of oil: comprising a seed crusher number 10, a pair of 7½ feet diameter edge stones, two 4 feet seed kettles, four pairs of 12 inch presses with press boxes, hair mats and meal bags, four sets of pumps with 1 inch and 2½ inch plungers, a cast-iron receiving tank, two cast-iron storage tanks, to hold each 1,000 gallons, pump for raising oil to the storage tanks, and the necessary shafting and gearing, prepared ready for fixing to either iron or timber framework.

A 20 Horse-power Engine and 28 Horse-power Boiler are recommended for the above.

ESTIMATE NO. 2.

For Plant to work 50 quarters of seed in 24 hours, yielding about 7½ tons of cake and 6,000 lbs. of oil: comprising 1 pair of seed crushing rolls, 9 inch diameter, 21 inches wide, 1 pair of 6 feet diameter edge runner stones, two 36 inch diameter seed kettles, two pairs of 12 inch diameter presses and pumps, with mats and meal bags, pump for storage tank, receiving tank, storage tank for 1,000 gallons of oil, and the necessary shafting and gearing, prepared for fixing to iron or timber framing.

A 12 Horse-power Engine and 16 Horse-power Boiler are recommended for the above.

ESTIMATE NO. 3.

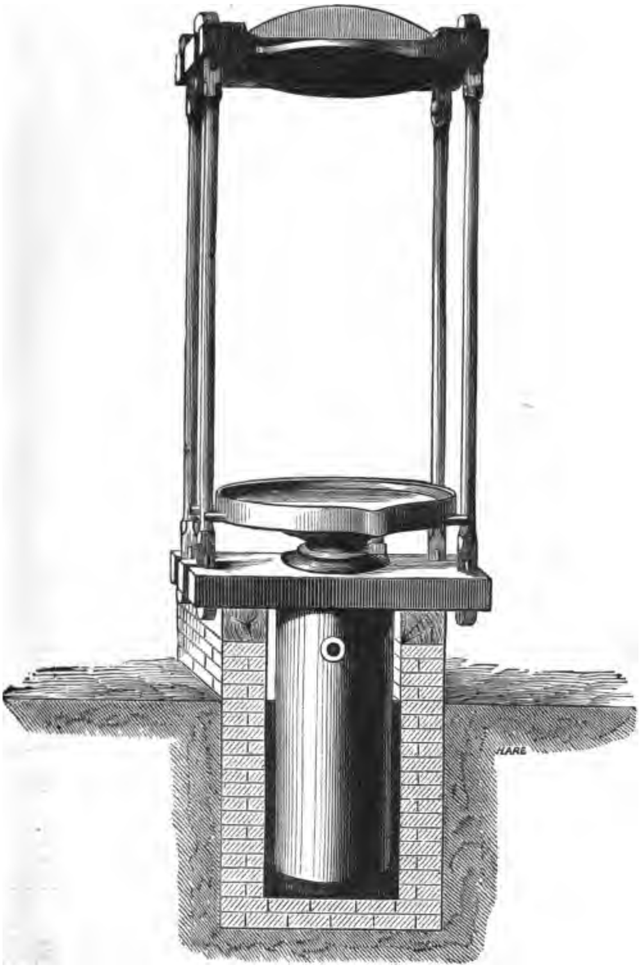
For Plant to work 25 quarters of seed in 24 hours, yielding 3¾ tons of cake, and 3,000 lbs. of oil: comprising pair of crushing rolls, 9 inch diameter by 12 inch wide, pair of 4 feet diameter edge runner stones, a 36 inch diameter seed kettle, one pair of 12 inch presses and pumps, with mats and meal bags, collecting tank, storage tank for 1,000 gallons of oil, with pump for raising same, and the necessary shafting and gearing ready for fixing to iron or timber framing.

A 6 Horse-power Engine and 8 Horse-power Boiler are recommended for the above.

ESTIMATE NO. 4.

For Plant suitable for a small Steam Engine, or for cattle; to work 10 quarters of seed in 24 hours, yielding about 1½ tons of cake and 1,200 lbs. of oil: comprising seed crushing rolls number 2, pair of 3 feet diameter edge stones, a 24 inch diameter heating kettle, one pair of 8 inch presses and pumps, with mats and meal bags, and the necessary shafting and gearing ready to fix to iron or timber framing.

HYDRAULIC OLIVE PRESSES, AS USED IN SPAIN.



HYDRAULIC OLIVE PRESSES.

Hydraulic Presses for extracting Oil from Olives are made in several ways, according to the practice of the country where they are used. The form shown in the Engraving is made by us chiefly for Spain. The Olives when crushed are placed in the round flat baskets known as "Capachos," a hollow being left in the middle of each basket. These baskets are piled on the follower of the press and boiling water is poured into and through them. After pressing for some time, the pressure is relaxed, and more hot water poured in, and this process is repeated until all the oil is extracted. The follower and head are made round to suit the shape of the "Capachos," and the follower is provided with a groove and spout, or with a union and flexible tube to carry away the oil to the receiver. It is not usual to use iron plates between the baskets in working on this system.

All these presses are made with wrought iron pillars, of great strength, turned bright, and with solid ends forged on, or strong nuts screwed to the ends.

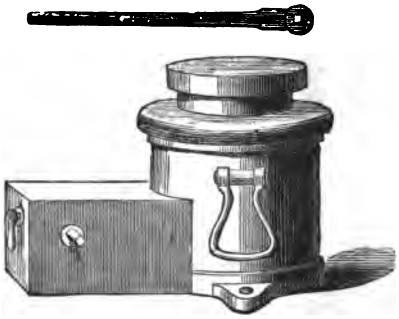
The press is shewn without pumps, as these differ according to circumstances. The various forms of pumps will be found fully described further on, in *Catalogue of Press Pumps.*

The following are the usual sizes of Olive Presses, other sizes and proportions can be made if needful.

Diam. of Ram	Power of Press	Diam. of Table		Height Table to Head		Rise of Ram		Approx. weight of press	Approx. dim. when packed	Price	Pumps
Inches	Tons	Ft.	In.	Ft.	In.	Ft.	In.	Cwt.	Cubic Feet	£	
8	**128**		〃 10	4	〃 0	3	〃 0	83	62	105	Single Pump, Class B, on separate cistern £15 0 0
9	**162**	2	〃 10	5	〃 10	3	〃 6	88	68	112	
10	**200**	2	〃 10	5	〃 10	3	〃 6	104	77	120	Double Pumps 2 & 1 inch Class B, on cistern ... £25 0 0
11	**242**	2	〃 10	5	〃 10	2	〃 6	103	68	120	
12	**288**	2	〃 10	5	〃 10	3	〃 6	126	83	160	Ditto ditto Class C... ... £38 0 0

HYDRAULIC LIFTING JACKS.

Hydraulic Lifting Jacks are small Hydraulic Presses, in which, for the sake of convenience and compactness, the pumps, cistern, and relief valve, are all contained in the body of the machine. In the class known as Ship Jacks, illustrated below, the cistern containing the pump, &c., is contained in the square box in front. The pump is worked by the handle fitting on the square end of the spindle; the relief valve for lowering the ram is opened by the small handle at the end. These small presses are of very general utility, not only for lifting but for many manufacturing purposes where pressure is required.



PRICES OF HYDRAULIC SHIP JACKS, WITH CAST-IRON CYLINDERS.

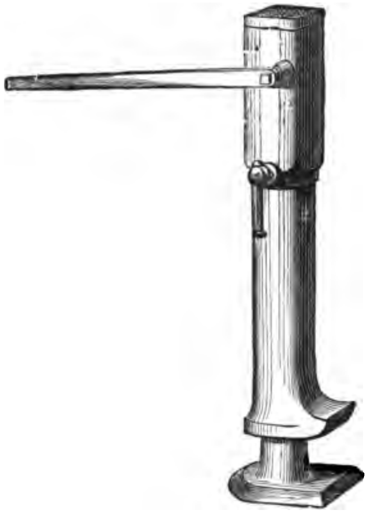
To lift... ...	20 tons	35 tons	50 tons	70 tons	100 tons	150 tons	200 tons
Height when down ...	—	14	14	14	14	14	14 in.
Will run out	—	7	7	7	7	7	7
	£10 10	£13 10	£16 10	£18 10	£20	£25	£30 each
If with hammered scrap-iron cylinders	£12	£15	£18 10	£21	£22 10	£28	£33 „

£2 5s. extra if with Safety Valve to indicate pressure.

The pump and cistern can be detached from the ram for action at a distance from the weight to be lifted.

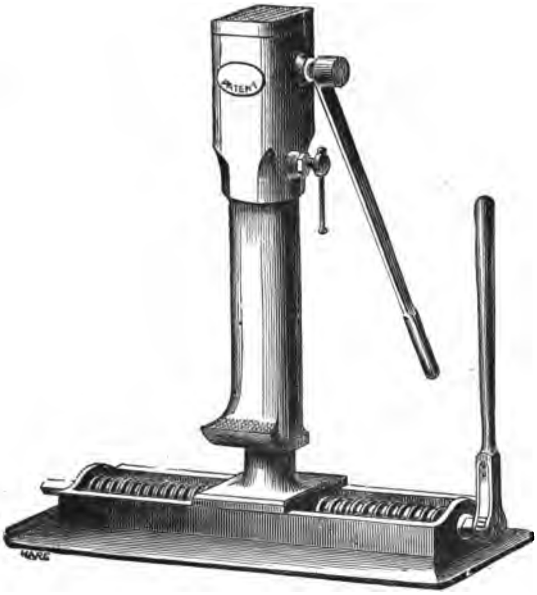
HYDRAULIC LIFTING JACKS.

In the Hydraulic Jacks shown below, the pump, relief valve, &c., are all contained in the body of the press. They are very compact and powerful tools, and one of the most generally useful applications of the principle of the Hydraulic Press. They are in general use on board the ships in H.M. Navy, in the Dockyards, &c., and upon almost all Lines of Railway. No large workshop should be unprovided with this means of saving labour.



PATENT HYDRAULIC JACKS.

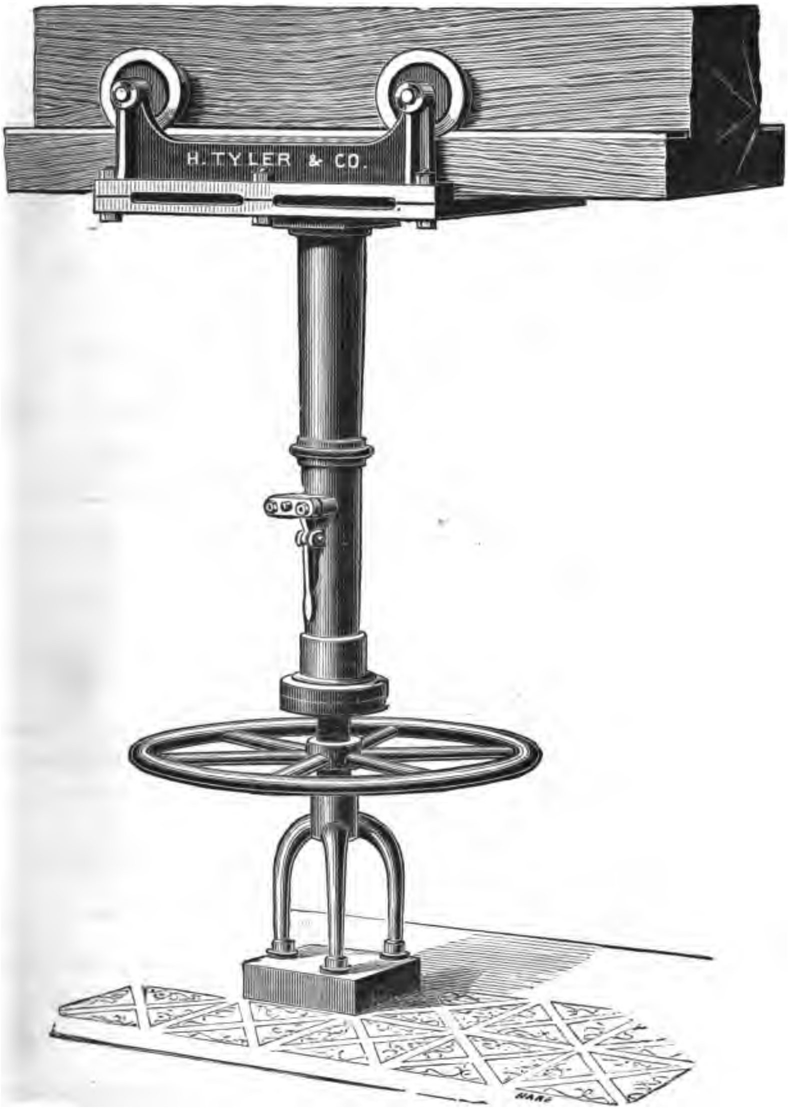
To lift	Total Height	Will run out	Approximate weight	Price
4 tons	23 in.	10 in.	57 lbs	£6 0
6 "	24 "	10 "	68 "	7 10
8 "	25 "	11 "	76 "	8 10
10 "	26 "	12 "	86 "	10 0
12 "	26 "	12 "	96 "	12 0
15 "	26 "	12 "	104 "	13 10
20 "	28 "	12 "	132 "	16 0
30 "	28 "	12 "	174 "	18 0
40 "	28 "	11 "	206 "	20 0
50 "	28 "	11 "	264 "	23 10
60 "	28 "	10 "	364 "	27 10



PATENT HYDRAULIC TRAVERSING JACKS.

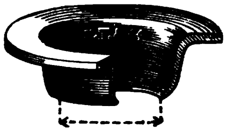
To lift	Price
4 tons	£9 0
6 "	10 0
8 "	11 10
10 "	13 0
12 "	15 0
15 "	18 10
20 "	21 0

SCREW PRESS,
FOR PRINTING FLOOR-CLOTH.



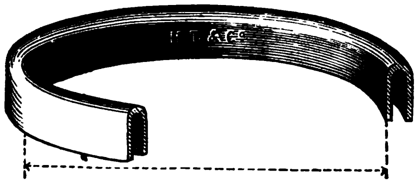
The annexed Illustration shows a form of Screw Press which we have made for some of the principal manufactures of Floor-cloth for printing the patterns. The press moves easily along a beam the whole length of the table. The printing block is pressed by a tripod, of suitable construction, attached to a screw which is run in and out of the pillar of the press by the hand-wheel. A spring catch secures the screw at the top of its travel and is released by a small lever. The screw runs in and out about 8 inches. By means of this machine the printing may be done with great rapidity and accuracy. Price ... £16 10

HYDRAULIC PRESS LEATHERS.



SINGLE-CUP LEATHERS, FOR PUMPS, &c.

Diameter	1	2	3	4	5	6 in.
	-/9	1/6	2/3	3/-	3/9	4/6 each.



DOUBLE-CUP LEATHERS, FOR HYDRAULIC PRESSES, LIFTS, &c.

Diameter	3	4	5	6	7	8	9	10	12	14	16 in.
	3/-	4/-	5/-	6/-	7/-	8/-	9/-	10/-	12/-	14/-	16/- each.

Note.—HAYWARD TYLER & CO. *have for very many years given special attention to the manufacture of Hydraulic Press Leathers, and take great care both in the selection of the hides used and in the process of manufacture.*

When large quantities are required we can often give a special quotation: the great variety of our manufactures enabling us to use up all the cuttings which would otherwise be wasted. We are therefore able to do this work at lower rates than other firms.

HYDRAULIC PRESSES.

FOR VARIOUS PURPOSES NOT DESCRIBED IN THE FOREGOING PAGES.

We have a great number of patterns for Hydraulic Presses for various special purposes which it is impossible to illustrate or describe in full in this work. Among others we may mention Experimental Presses for Lecture Rooms, and various forms of Apparatus for Illustrating the Phenomena of Hydraulics, as made for various Professors in England and abroad—Presses for testing amd illustrating the strength of materials under compressive and tensile strains—Presses for investigating the flow of solids under heavy pressures—Presses for cutting gold and silver, brass, &c., &c.

Some of our customers may be surprised at the absence from these pages of many forms of our presses well-known to them, but the writer's apology must be that as the work proceeded, the number and variety of our patterns was found to be so great that it was simply impossible to attempt to illustrate them all fully.

HYDRAULIC LIFTS AND HOISTS FOR PASSENGERS OR GOODS.

Hydraulic Lifts are divided into two classes, viz., those in which the weight is lifted by the direct action of the ram, and those in which the power is communicated by means of a rope or chain. The former are most correctly termed "Lifts," and the latter "Hoists." When a weight is raised rapidly to a considerable height, the machine is termed a "Whipping Hoist."

The Direct-Acting Lifts are in some ways the safest in use, as they are not dependent on the strength of a chain or rope. For great heights, however, they are not always convenient, as the cylinders have to be sunk below the lowest floor to a distance more than the whole height of the lift.

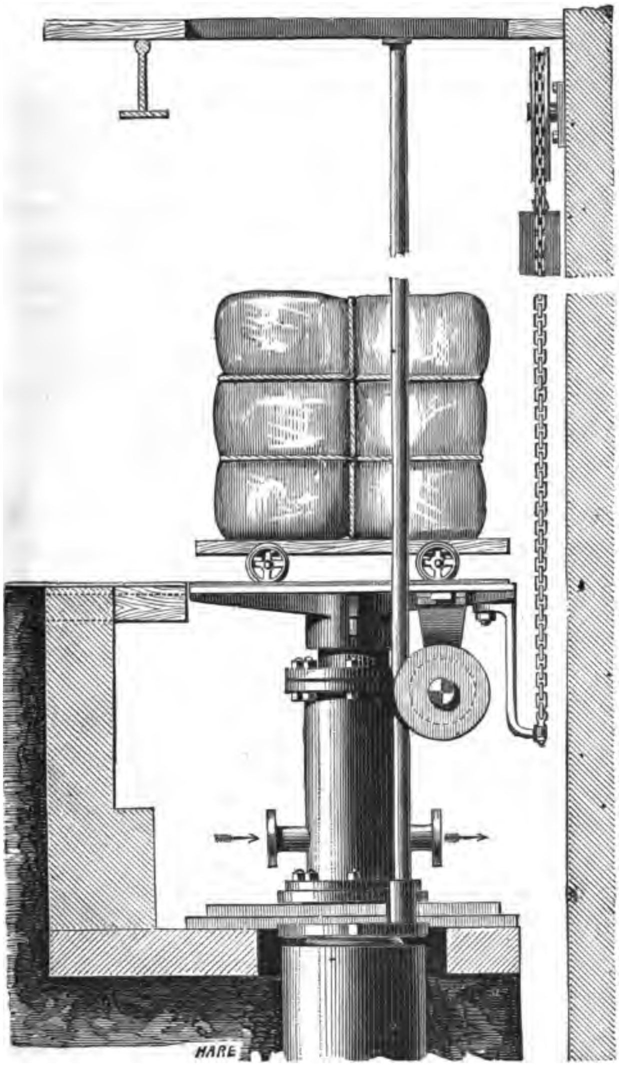
Further on will be found descriptions both of these and also of various forms of Chain Hoists. To the latter we can attach safety apparatus which prevents the possibility of the occurrence of a dangerous accident.

These Lifts and Hoists may all be worked either by the pressure due to gravitation from an elevated cistern (as in the Hoist which we erected for the Government at Somerset House, in the Lift at the Alliance Bank, &c., &c.,) or by pressure from a high pressure main supplied by an accumulator, (as in the various Whipping Hoists, supplied by us to the East and West India Docks,) or by suitable pumps. For this purpose our Steam Pumps are especially convenient (as in the Passenger Lift at the large range of offices known as Palmerston Buildings, London.) One great advantage of using Steam Pumps is that the same Pump that works the Lift may serve various other purposes, acting as a Fire Engine &c., &c. *(See Illustration, page 68.)*

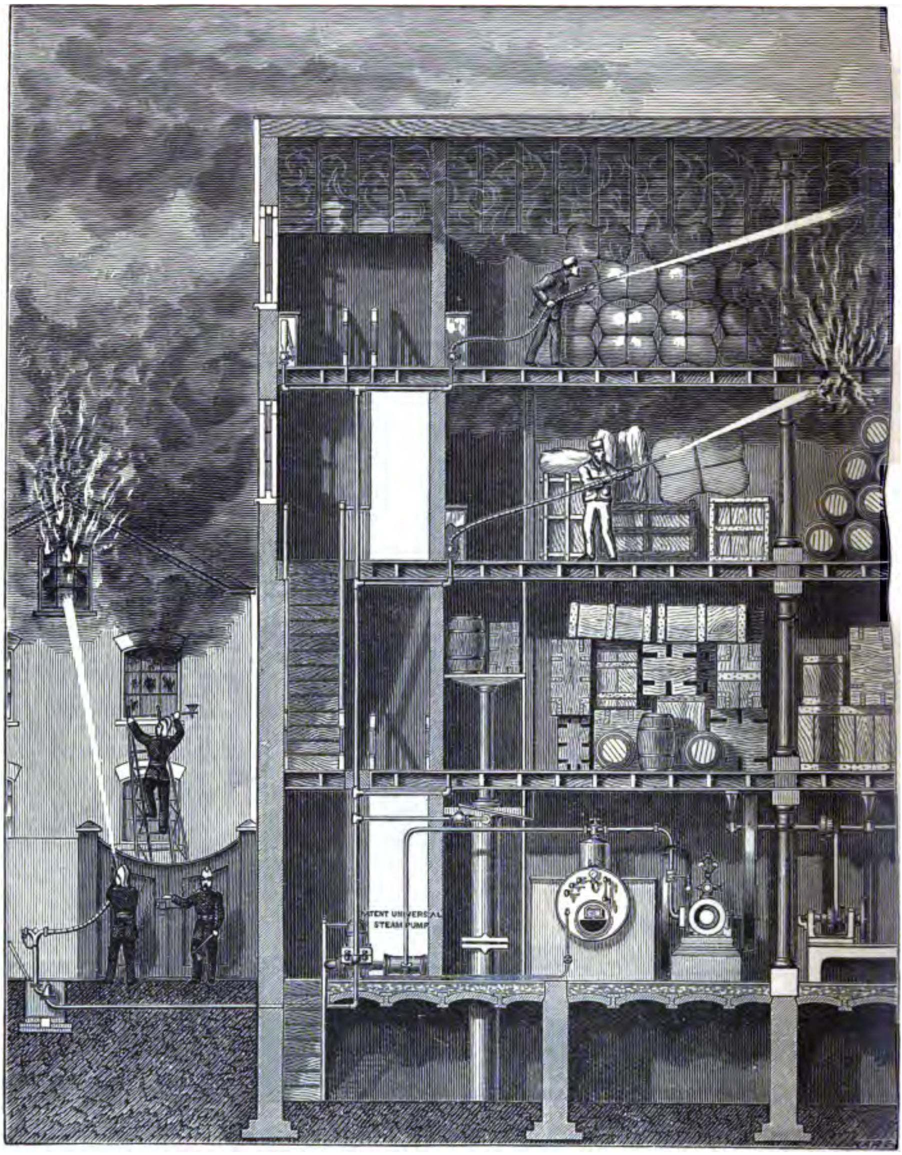
In this respect it is well to be guided by the circumstances of each individual case. It is desirable to bear in mind that some forms of Hoists—as for example our Whipping Hoists—can be worked by steam pressure as well as by water.

We can recommend our "Rider" patent Hot-air Pumping Engine as one of the most convenient means of raising water to an elevated cistern, especially where steam power is not available.

DIRECT-ACTING HYDRAULIC LIFT, FOR BANKS, HOTELS, RAILWAY STATIONS, WAREHOUSES, &c.



HYDRAULIC LIFT, WORKED BY DIRECT-ACTING STEAM PUMP, WHICH ALSO SERVES AS A FIRE ENGINE.



DIRECT-ACTING HYDRAULIC LIFTS FOR GOODS OR PASSENGERS.

This form of Lift is used on Railways for elevating and lowering trucks, &c.; in Banks for raising and lowering books and safes from and to the cellars; in Warehouses, Docks, and Factories, for communication between the various floors, and in Hotels and ranges of Chambers or Offices, for the convenience of the visitors and for luggage. It is, of all Lifts, the most simple in its construction, and the least liable to get out of order. The Lift consists of an elongated cylinder in which is a ram or piston accurately turned along the whole of its length and sufficiently long to raise the platform which it supports on its top to the required height. The water is prevented from escaping from the cylinder by a cup leather (as in a Hydraulic Press) or by cotton or hemp packing. The platform is guided in its rising by suitable bars, either of wood or iron, arranged as may be most convenient. The surplus weight of the moving parts of the machine is counterbalanced. The valves for raising and lowering are regulated from any floor required or from the table of the Lift itself. We can arrange these valves in such a manner that the attendant at the bottom can set a handle for the Lift to stop at any given floor. The Lift is also arranged to stop itself on reaching the end of its travel to prevent the possibility of accidents.

In Goods Lifts the table is generally left plain for convenience of moving the goods on and off. In Passenger Lifts a wooden cage or "rising room" is fitted on to the table; this can be made as comfortable and luxurious as may be wished.

The size of the ram depends upon the weight to be lifted and on the pressure available, either by gravitation from water works or cistern, or derived from pumps.

The following tables give approximately the weight that can be raised by rams of various sizes at different pressures, allowing a reasonable margin for friction and weight of unbalanced parts.

TABLE OF WEIGHTS RAISED BY DIRECT-ACTING HYDRAULIC LIFTS.

For low-pressures as from Water Works Mains, or Cisterns at the top of the building, (each 2 feet of fall yields about 1 lb. pressure.)

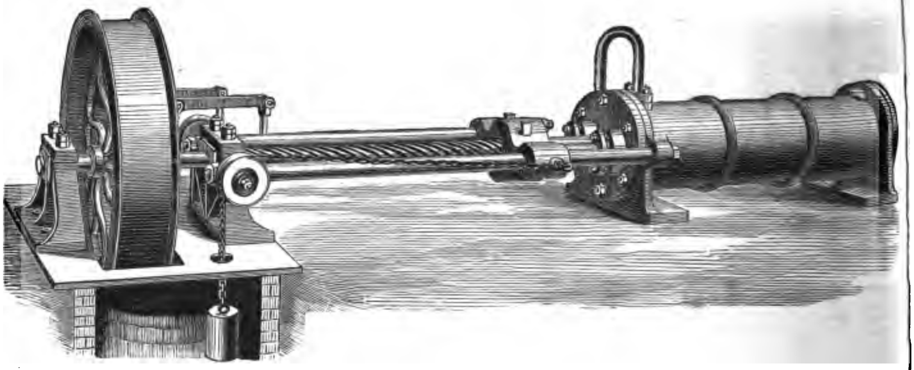
Diameter of Ram in Inches	Pressure available on Ram, in pounds per square inch.								
	10	20	30	40	50	60	80	100	150
	Weight that the Lifts may be estimated to raise (after allowing for friction, &c.)								
	Tons Cwt. Qrs. Lbs.	Tons Cwt. Qrs. Lbs.	Tons Cwt. Qrs. Lbs.	Tons Cwt. Qrs. Lbs.	Tons Cwt. Qrs. Lbs.	Tons Cwt. Qrs. Lbs.	Tons. Cwt. Qrs. Lbs.	Tons Cwt. Qrs. Lbs.	Tons. Cwt. Qrs. Lbs
3	0 " 0 " 1 " 7	0 " 0 " 2 " 14	0 " 1 " 0 " 0	0 " 1 " 1 " 0	0 " 2 " 1 " 0	0 " 2 " 2 " 17	0 " 3 " 2 " 9	0 " 4 " 1 " 18	0 " 7 " 0 " 4
4	0 " 0 " 2 " 6	0 " 1 " 0 " 13	0 " 1 " 2 " 20	0 " 2 " 3 " 0	0 " 4 " 2 " 0	0 " 4 " 3 " 0	0 " 6 " 3 " 3	0 " 7 " 3 " 10	0 " 11 " 3 " 0
5	0 " 0 " 3 " 14	0 " 1 " 3 " 0	0 " 2 " 2 " 14	0 " 4 " 1 " 0	0 " 6 " 0 " 12	0 " 7 " 1 " 7	0 " 9 " 3 " 8	0 " 12 " 1 " 2	0 " 18 " 1 " 17
6	0 " 1 " 1 " 0	0 " 2 " 2 " 2	0 " 3 " 3 " 4	0 " 6 " 0 " 6	0 " 8 " 3 " 9	0 " 10 " 2 " 11	0 " 14 " 0 " 15	0 " 17 " 2 " 18	1 " 7 " 1 " 14
8	0 " 2 " 2 " 20	0 " 5 " 1 " 15	0 " 8 " 0 " 8	0 " 10 " 3 " 2	0 " 15 " 3 " 0	0 " 18 " 3 " 11	1 " 5 " 1 " 0	1 " 11 " 1 " 18	2 " 7 " 0 " 14
10	0 " 4 " 1 " 0	0 " 8 " 1 " 18	0 " 12 " 2 " 13	0 " 16 " 3 " 9	1 " 4 " 2 " 4	1 " 9 " 2 " 0	1 " 19 " 1 " 0	2 " 9 " 0 " 10	3 " 13 " 0 " 0
12	0 " 6 " 0 " 19	0 " 14 " 0 " 14	1 " 1 " 1 " 0	1 " 8 " 1 " 0	1 " 15 " 1 " 7	2 " 2 " 1 " 14	2 " 16 " 2 " 0	3 " 10 " 0 " 10	5 " 6 " 0 " 0
14	0 " 9 " 3 " 13	0 " 19 " 1 " 0	1 " 8 " 3 " 11	1 " 18 " 2 " 0	2 " 8 " 0 " 10	2 " 17 " 3 " 0	3 " 17 " 0 " 0	4 " 15 " 1 " 0	7 " 4 " 2 " 0

TABLE OF WEIGHTS RAISED BY DIRECT-ACTING HYDRAULIC LIFTS.

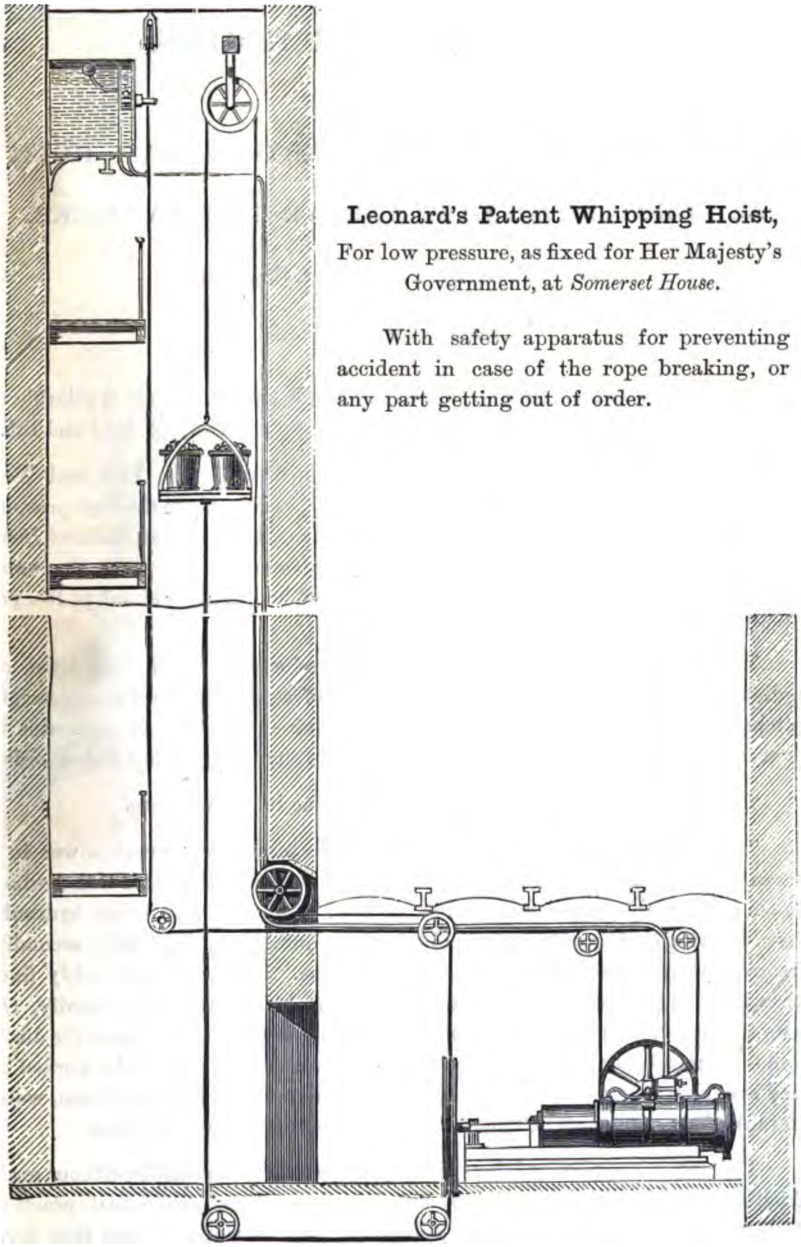
For Higher pressures, as from Hydraulic Mains, Accumulators, or Pumps.

	Pressure available on Ram in pounds per square inch.							
Diameter of Ram in Inches	250	300	400	500	600	700	1000	2240
	Weight that the Lift may be estimated to raise (after allowing for friction, &c.)							
	Tons Cwt. Qrs. Lbs.	Tons Cwt. Qrs. Lbs.	Tons Cwt. Qrs. Lbs.	Tons Cwt. Qrs. Lbs.	Tons Cwt. Qrs. Lbs.	Tons Cwt. Qrs. Lbs.	Tons Cwt. Qrs. Lbs.	Tons Cwt. Qrs. Lbs.
3	0 ″ 11 ″ 3 ″ 9	0 ″ 14 ″ 1 ″ 0	0 ″ 18 ″ 3 ″ 2	1 ″ 3 ″ 2 ″ 19	1 ″ 10 ″ 1 ″ 4	1 ″ 15 ″ 1 ″ 10	2 ″ 10 ″ 2 ″ 0	5 ″ 13 ″ 0 ″ 0
4	1 ″ 10 ″ 0 ″ 0	1 ″ 5 ″ 1 ″ 0	1 ″ 13 ″ 2 ″ 16	2 ″ 4 ″ 1 ″ 0	2 ″ 14 ″ 0 ″ 0	3 ″ 3 ″ 0 ″ 0	4 ″ 10 ″ 0 ″ 0	10 ″ 1 ″ 0 ″ 0
5	1 ″ 13 ″ 0 ″ 0	2 ″ 0 ″ 0 ″ 0	2 ″ 12 ″ 2 ″ 9	3 ″ 5 ″ 3 ″ 0	4 ″ 4 ″ 0 ″ 15	4 ″ 18 ″ 0 ″ 17	7 ″ 0 ″ 1 ″ 0	15 ″ 14 ″ 0 ″ 9
6	2 ″ 7 ″ 1 ″ 8	2 ″ 17 ″ 0 ″ 0	3 ″ 15 ″ 3 ″ 0	4 ″ 14 ″ 2 ″ 17	6 ″ 1 ″ 0 ″ 18	7 ″ 1 ″ 1 ″ 11	10 ″ 3 ″ 1 ″ 0	22 ″ 12 ″ 1 ″ 7
8	4 ″ 4 ″ 0 ″ 16	5 ″ 1 ″ 0 ″ 0	6 ″ 14 ″ 2 ″ 14	8 ″ 8 ″ 1 ″ 4	10 ″ 15 ″ 1 ″ 7	12 ″ 11 ″ 2 ″ 0	18 ″ 2 ″ 1 ″ 0	40 ″ 4 ″ 0 ″ 18
10	7 ″ 0 ″ 1 ″ 0	8 ″ 8 ″ 1 ″ 6	11 ″ 4 ″ 1 ″ 17	14 ″ 0 ″ 2 ″ 0	16 ″ 16 ″ 2 ″ 11	19 ″ 12 ″ 3 ″ 0	28 ″ 1 ″ 0 ″ 0	62 ″ 16 ″ 2 ″ 15
12	10 ″ 1 ″ 3 ″ 14	12 ″ 2 ″ 0 ″ 16	16 ″ 2 ″ 3 ″ 12	20 ″ 3 ″ 2 ″ 8	24 ″ 3 ″ 1 ″ 0	28 ″ 5 ″ 0 ″ 0	40 ″ 7 ″ 1 ″ 0	90 ″ 8 ″ 0 ″ 0
14	13 ″ 14 ″ 3 ″ 8	16 ″ 9 ″ 3 ″ 4	21 ″ 19 ″ 3 ″ 0	27 ″ 9 ″ 2 ″ 16	32 ″ 19 ″ 2 ″ 8	38 ″ 9 ″ 2 ″ 0	54 ″ 19 ″ 1 ″ 4	124 ″ 0 ″ 1 ″ 0

LEONARD'S PATENT WHIPPING HOIST, FOR HIGH PRESSURE OF WATER, AS FIXED AT THE EAST AND WEST INDIA DOCKS, &c.



LEONARD'S PATENT WHIPPING HOIST.



Leonard's Patent Whipping Hoist,
For low pressure, as fixed for Her Majesty's Government, at *Somerset House.*

With safety apparatus for preventing accident in case of the rope breaking, or any part getting out of order.

HYDRAULIC HOISTS, (OR LIFTS) FOR PASSENGERS OR GOODS.

LEONARD'S PATENT HYDRAULIC OR STEAM HOISTS, AS USED AT THE EAST AND WEST INDIA DOCKS, GOVERNMENT OFFICES, &C.

These Hoists, which have been tested by ample experience, are applicable to high or low pressures, and can be adapted to every variety of load and lift.

Thus, for example: those which we fixed, in 1870, for the East and West India Dock Company, raise one ton sixty feet high, working from the high pressure hydraulic mains, (700 lbs. pressure per square inch,) while one at *Somerset House* (Inland Revenue Offices) raises a lift about the same distance with the water pressure obtained from a cistern at the top of the building, or about 35 lbs. *per* square inch.

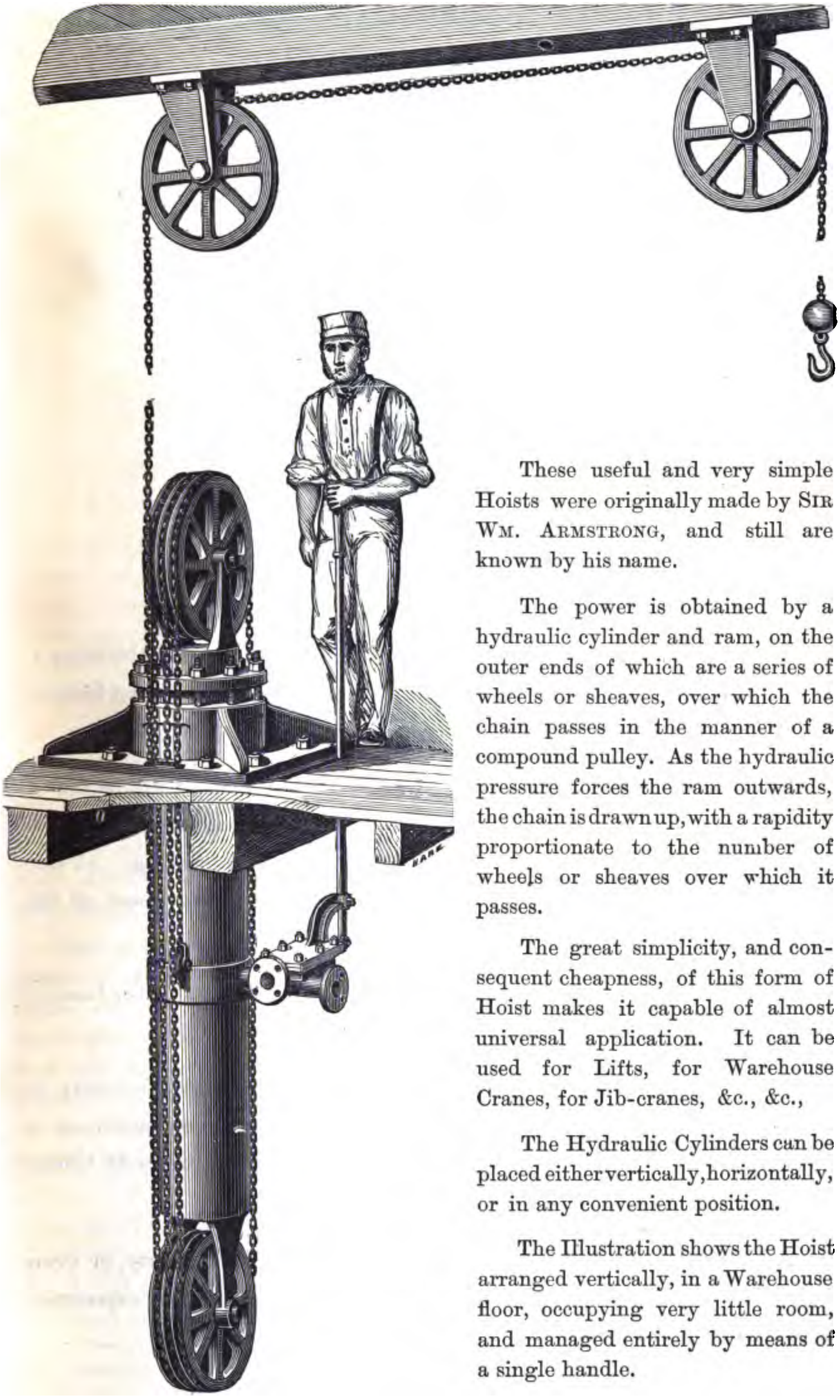
The very rapid action of these Hoists is produced by a winding drum, or pulley, which is caused to revolve by the action of a cross-head on a very steeply pitched screw. These Lifts are fitted, when required, with safety apparatus to prevent accident in case of the rope breaking or any part getting out of order.

The Hoist may also be applied to a Jib-crane in a warehouse.

This Hoist possesses several important features, viz.: great power in a small space, small friction of its working parts compared with geared cranes which lose a considerable power by friction, or even compared with other hydraulic cranes having chains and blocks to obtain the required length of lift; secondly, its great compactness and handiness, and the fact that it can be readily fixed anywhere and as readily converted into a portable crane; and, thirdly, the simplicity of construction and fewness of working or wearing parts, and the direct and economical way in which the power is transmitted. It can also be worked by any available source of power, as for instance high or low pressure steam, water in tanks for common service pipe, or from high-pressure service pipes.

The power is applied to lift as directly to the weight as possible without great friction, and no objectionable features have been found in actual practice. Nothing can exceed the regularity and smoothness of working, and they have in every way given satisfaction.

COMPOUND (OR MULTIPLYING) CHAIN HOISTS.



These useful and very simple Hoists were originally made by Sir Wm. Armstrong, and still are known by his name.

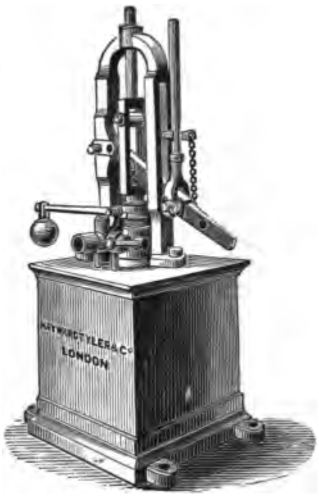
The power is obtained by a hydraulic cylinder and ram, on the outer ends of which are a series of wheels or sheaves, over which the chain passes in the manner of a compound pulley. As the hydraulic pressure forces the ram outwards, the chain is drawn up, with a rapidity proportionate to the number of wheels or sheaves over which it passes.

The great simplicity, and consequent cheapness, of this form of Hoist makes it capable of almost universal application. It can be used for Lifts, for Warehouse Cranes, for Jib-cranes, &c., &c.,

The Hydraulic Cylinders can be placed either vertically, horizontally, or in any convenient position.

The Illustration shows the Hoist arranged vertically, in a Warehouse floor, occupying very little room, and managed entirely by means of a single handle.

HYDRAULIC PRESS PUMPS.



The Pumps needed for working Hydraulic Presses, and for obtaining a very high water pressure for other purposes, such as testing pipes and boilers, &c., are made in several ways, according to the necessities of the case.

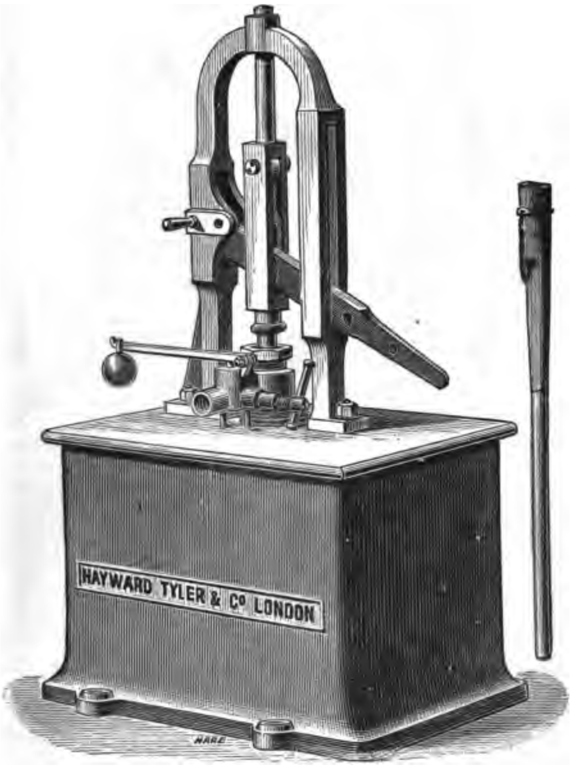
In all forms of Hydraulic Press Pumps which we make, it will be found that attention has been given to the great importance of strength and durability, and easy access to the valves, &c., for cleaning and grinding. All our pump plungers are packed with properly constructed cup leathers, and all the valves are conical gun-metal valves ground into their seats.

We find that no other arrangement of leather packing, and no other form of valve, can be recommended for constant wear.

We would draw the attention of all purchasers of Hydraulic Machinery to the great importance of making sure that all details are constructed on a proper system, otherwise disappointment and loss are certain to result before long.

Many of our Press Pumps having been at work twenty, thirty, or even forty years, we are able to speak with some certainty from our own experience as to the best forms for work.

FIG. C. OR "BRAMAH" PATTERN HYDRAULIC PRESS PUMPS.



This is the form of pump which has been proved by experience to be the most durable and capable of lasting without getting out of order under the most severe strains.

The pump is arranged with safety valve and relief valve of the most approved construction, and is therefore complete in itself for working a single press, or by the introduction of proper stop valves the same pump may work any number of presses. The pump lever is made so that a joint can be readily attached for working from overhead steam power, (crank, eccentric, &c.,) and is provided with socket-handle for hand power.

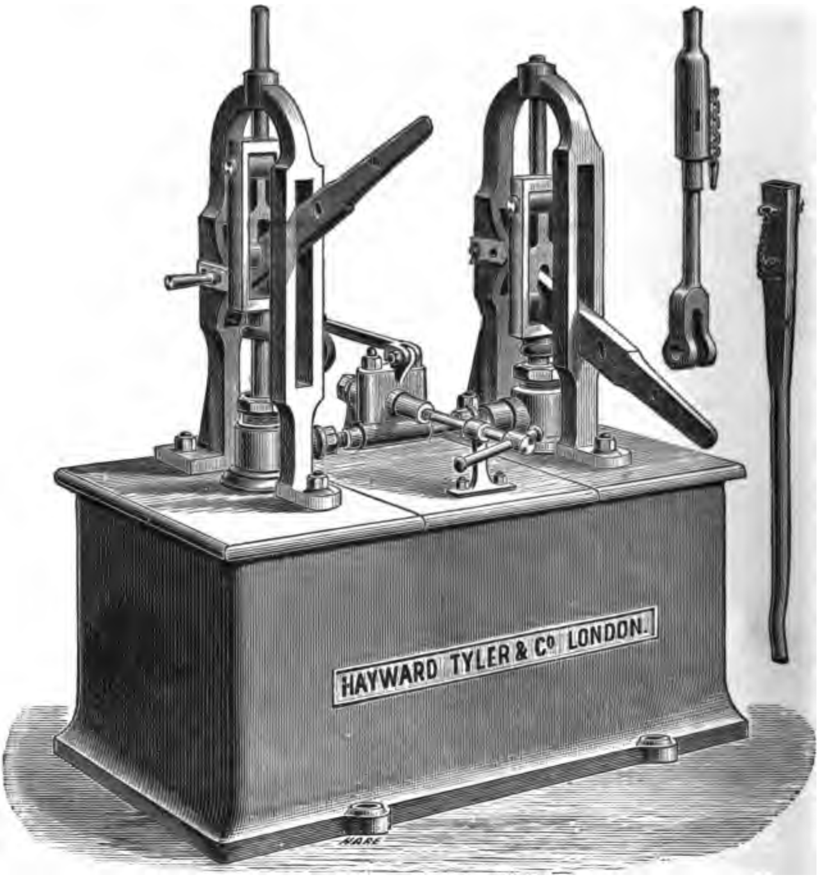
Price of Single Pump, (Fig. C), 1 inch or less in diameter, complete with safety valve, relief valve, and lever, on cistern containing about 6 gallons, for light work, testing, &c. £18 0 0

Dimensions when packed, 10 cubic feet. Weight 2 cwt. 3 qrs.

Price of Single Pump complete, stronger pattern, for hand or power, with socket handle and lever arranged for ready attachment to overhead steam gear, on cistern containing about 12 gallons, pump 1 inch or less in diameter	£22 0 0
Price of ditto with 1½ or 2 inch pump	£25 0 0
Price of ditto with 2½ inch pump	£27 0 0
Extra for knuckle joint, sleeve and pin, for working by steam power	£ 2 10 0

Dimensions of above when packed, 18 cubic feet. Weight, 4 cwt. Cost of packing 5 per cent.

FIG. C. OR "BRAMAH" PATTERN HYDRAULIC PRESS PUMPS.



This Engraving shows a pair of Fig. C, or Bramah Pattern Press Pumps, on strong cast-iron cistern holding about 50 gallons, of our improved pattern, with safety valve, stop valves, &c. The levers provided with socket-handles for hand power, and arranged for ready attachment to overhead steam gear.

The sizes of these pumps differ according to the speed and power required. The speed (or larger) pump is generally either 2 or 2½ inch in diameter, and the power (or smaller) pump ¾ inch or 1 inch.

Price of pair of Press Pumps, (Fig. C), 1 and 2 inch (or less), complete with safety valve, relief valve, socket-levers, &c. £36

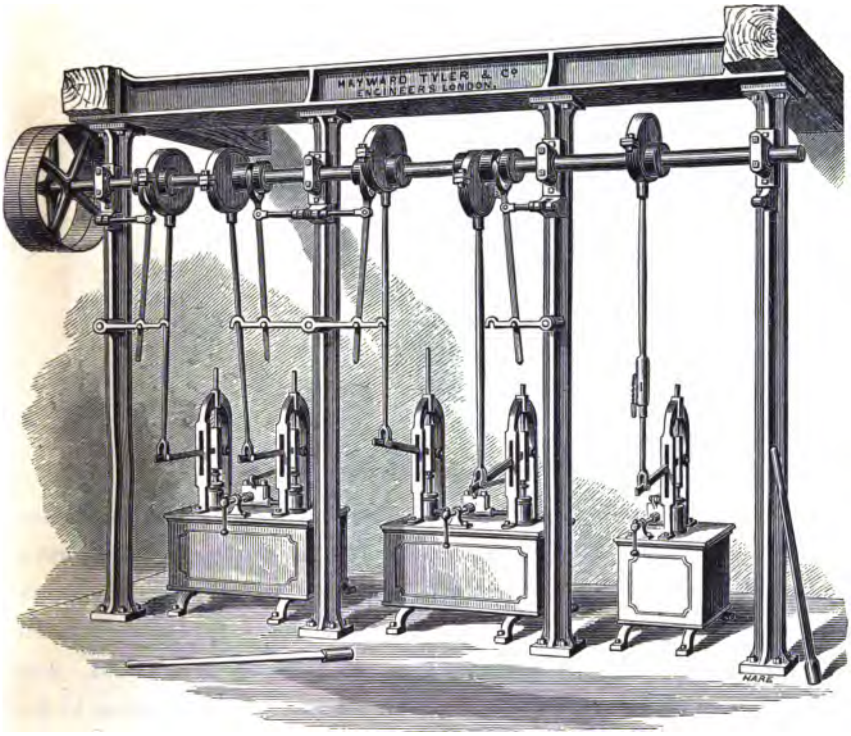
Price of ditto with 2½ inch speed pump £38

Extra for knuckle joint, sleeve and pin, for steam power ... £2 10 each pump

Approximate weight, 8 cwt. Dimensions when packed, 39 cubic feet.

Cost of packing 5 per cent.

HYDRAULIC PRESS PUMPS.

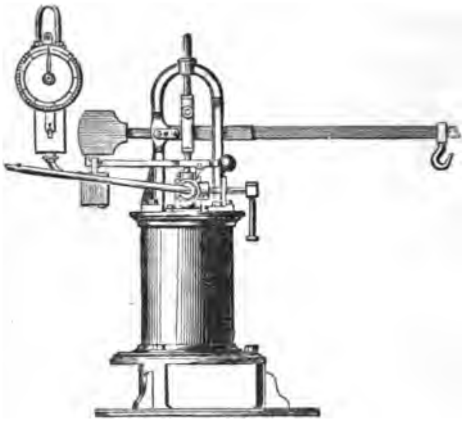


The above Engraving shows the arrangement frequently adopted in Factories where there are large ranges of presses requiring to be worked together or separately.

It will be seen that each pump is provided with an eccentric on an overhead shaft. Two ways of connecting the pumps with the presses are shown, viz.: in the two sets of double pumps the eccentric is thrown into gear by a clutch and lever, and in the single pump, to the right, the eccentric rod ends in a sleeve, working over a rod connected with the pump lever, and set in work by a key passed through both.

Any of the pumps can be readily disconnected from the over-head gear, and worked by the hand lever. The design of the general arrangement is copied from some sets of pumps, erected by us, at one of the large London Factories, which have been very many years in constant work.

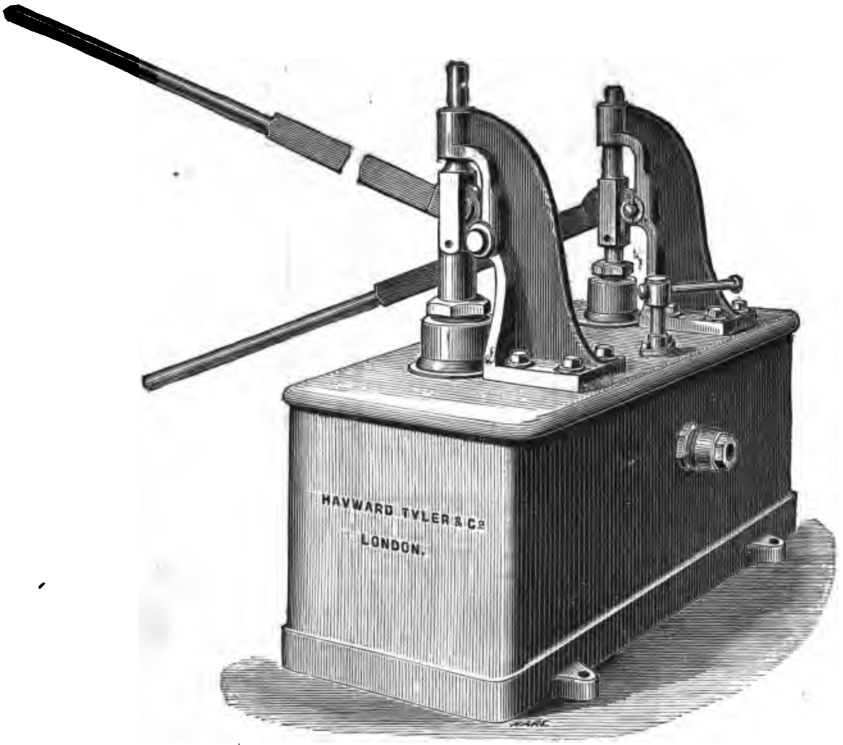
HYDRAULIC PUMP,
FIG. C. OR "BRAMAH" PATTERN,
FOR PROVING, TESTING OR ANY SIMILAR DELICATE PROCESSES.



The pump shown in the engraving, is one specially made by us for *various* processes of testing. The piston is exactly ½ in. in diameter by Whitworth's Standard Gauge. The lever is accurately divided into 22 equal lengths, in the manner of a steel-yard, each length being the same as the distance between the sling and fulcrum pin. The lever is exactly balanced by a weight. Any weight placed on the graduated lever produces a pressure in proportion to the leverage at which it is placed: thus, 1 lb. weight at the end of the lever is equal to 22 lbs. on the piston of pump, and 22 lbs. per circular ½ in. precisely equals 1 cwt. per square inch. By this instrument, processes of proving or testing can be conducted with much more absolute accuracy than with any pressure gauge; or the pump can be used for proving in the ordinary way in connection with an improved form of Hydraulic Pressure Gauge. All parts are most accurately fitted, and the pump will work up to a very high pressure. We use a pump of this description for testing all our Hydraulic Pressure Gauges, &c.

The price of the pump complete, with safety and relief valve, but without pressure gauge is	£17 10 0
Weight about	2 cwt.
Dimensions when packed—with stand, about	17 cubic feet.
" " without stand, about	5 cubic feet.

HYDRAULIC PRESS PUMPS.



"Fig. B" PATTERN.

This form of Hydraulic Press Pump has been designed and brought out by us, to meet the frequent need of a more simple and compact form of press pumps than the "Bramah" pattern. The parts are all proportioned with the greatest care, and the materials and workmanship are in all respects equal to our most expensive form of pumps. For places where the pumps are to be worked by hand only, they can be strongly recommended.

Price of single Press Pump, Fig. B, one inch or less, on strong cast-iron cistern, complete with safety and relief valve, and hand lever, as shown in the engraving £15 0 0

Price of ditto ditto 2 inch... ... ... £16 10 0

Price of ditto ditto 2½ inch £18 0 0

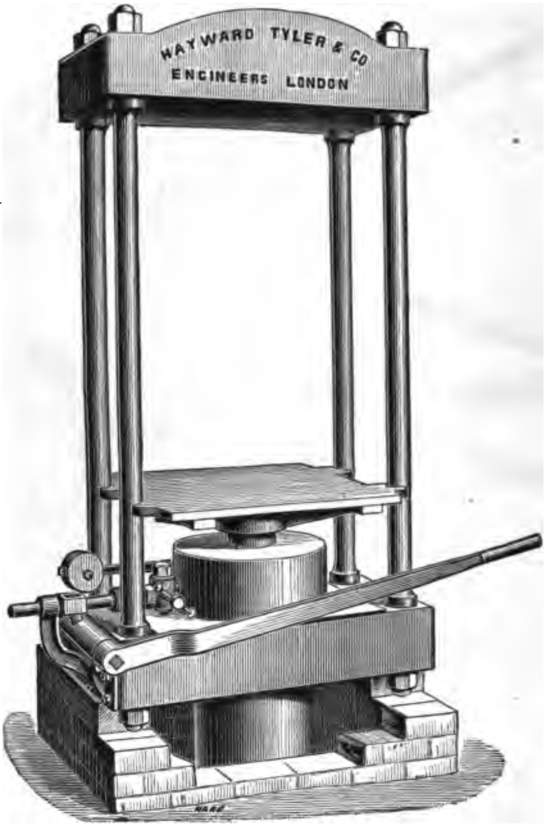
Approx. weight, 3 to 4 cwt. Dimensions when packed, 14 cubic feet.

Price of double Press Pumps, 1 & 2 in. or less, as above £25 0 0

Price of ditto ditto with 2½ in. speed pump £27 0 0

Approx. weight, 5 to 6 cwt. Dimensions when packed, 20 cubic feet.

HYDRAULIC PRESS PUMPS.

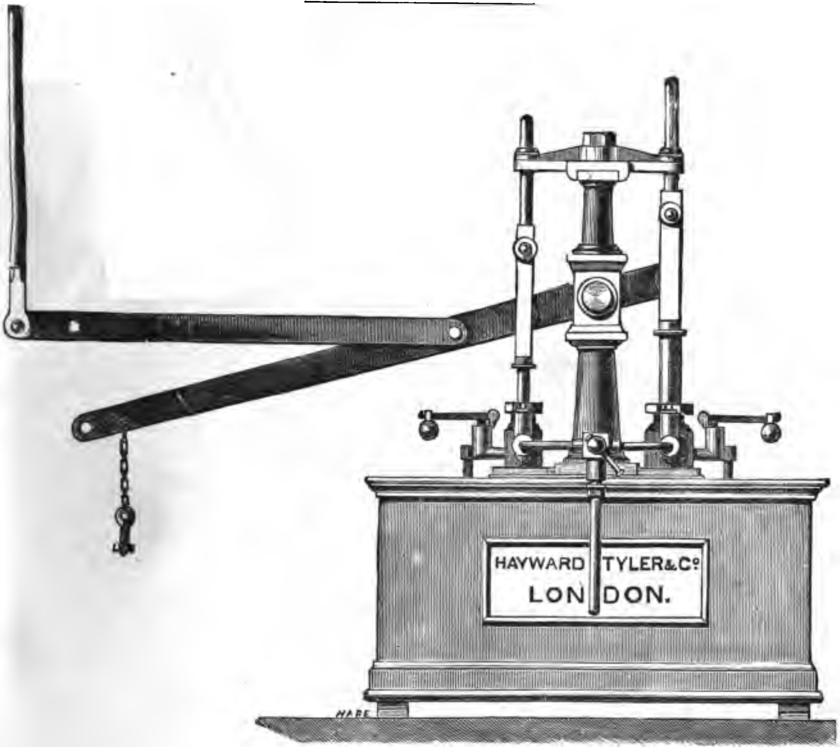


"Fig. C" PATTERN.

The form and arrangement of Press Pump shown in engraving, has been designed by us as the most efficient possible, where it is desired to have great compactness as well as cheapness, in the arrangement of the smaller class of Hydraulic Presses. Although the form of pump is one which can be produced at small expense, we have not sacrificed the principles of construction which we have found necessary for efficient working. The valves are all of gun-metal, of proper design, and ground into their seats; they are easily accessible by removing a single cap. The pump is provided with safety valve and relief valve of the best construction. The plungers are all packed with properly constructed cup leathers. In this arrangement, the bed-plate of the press serves as the pump cistern, and the pumps are placed either within the cistern or above it, as is most convenient in the construction of the press.

The price of the pumps according to this plan, is given with the various forms of presses to which it is applicable. For one pump the price is about £7 10 0 above the price of the press, and for two pumps about £12 0 0

HYDRAULIC PRESS PUMPS.



The above Engraving shows a very useful arrangement of a pair of pumps for working either by hand or from over-head gear. The pumps are of the strongest class, provided with safety valves and discharge valve, &c. They are mounted on a very strong cast-iron cistern, with pillar, guides, wrought-iron lever, and coupling joint for rod. They are easily thrown out of work by detaching the bolt which connects the levers.

Price with pumps of 1 in. diameter and under £42 0 0

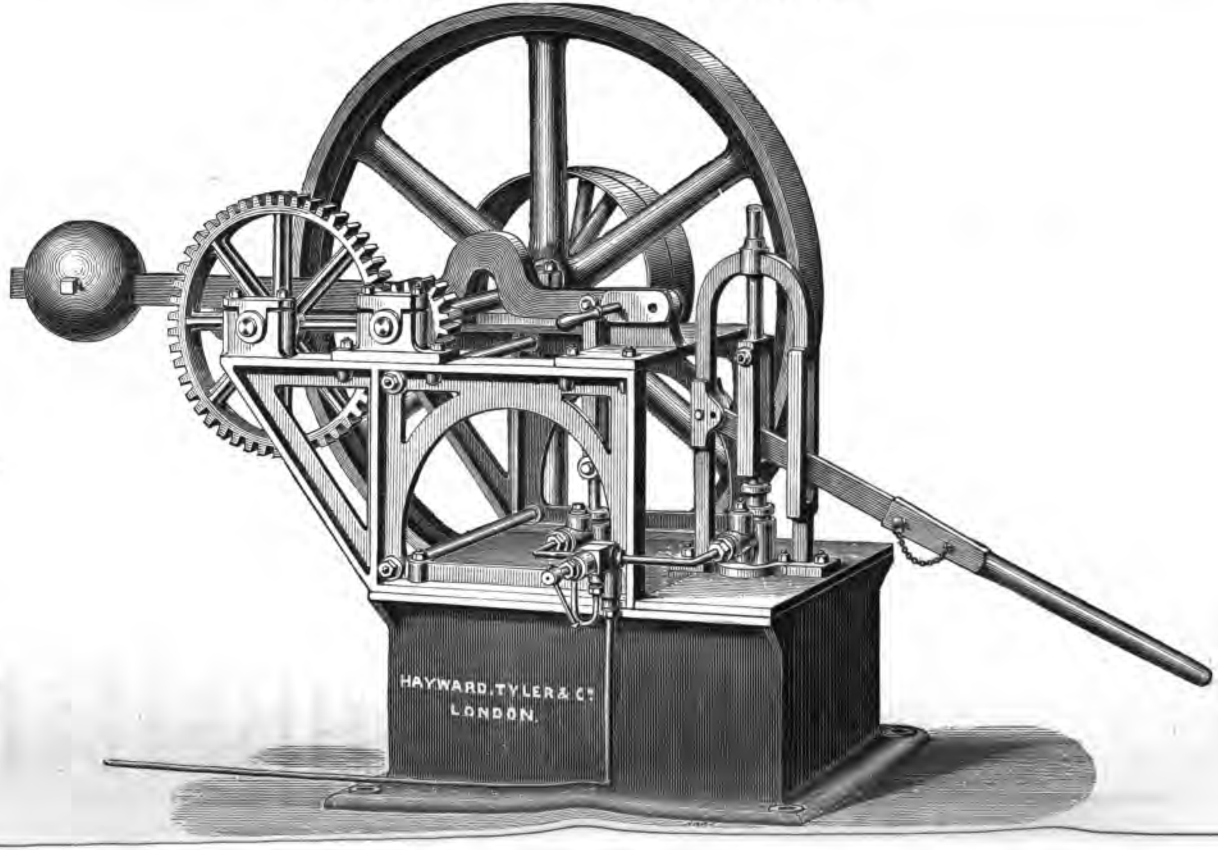
Price with pumps from 1 in. to 2 in. diameter £45 0 0

Cost of packing 5 per cent.

Approximate weight 9 cwt.

Approximate shipping dimensions 40 cubic feet

HYDRAULIC PRESS PUMPS.



HYDRAULIC PRESS PUMPS, FOR CONSTANT PRESSURE.

In many processes which are conducted by means of Hydraulic Presses it is of great importance to secure a constant pressure which shall not at any time be exceeded, but which shall, on the other hand, be kept up in spite of the material gradually yielding to the force applied, and so relieving the pressure on the Ram. In many places this object is attained by the simple means of employing a man to go round to the presses periodically and "pump them up," if they are found to require it. This, however, besides being very expensive, is a very inefficient plan, because the pressure is necessarily intermittent.

We use various arrangements for securing a constant pressure by mechanical means, and we can, among others, strongly recommend the machine shewn in the accompanying engraving, which we first constructed (in connection with the rest of the machinery) for the process of making Hale's celebrated war rockets.

It will be seen that this machine combines a hand pump (which is of great convenience in first setting the press to work) and a pump worked by steam or other power. The power from the driving pulleys is communicated through a pinion to a spur-wheel on the main shaft. This shaft is provided with a crank or cam, which, at each revolution, lifts a weighted lever attached to the pump. This lever falls only by virtue of the weight at its end, which weight can be adjusted to any power required.

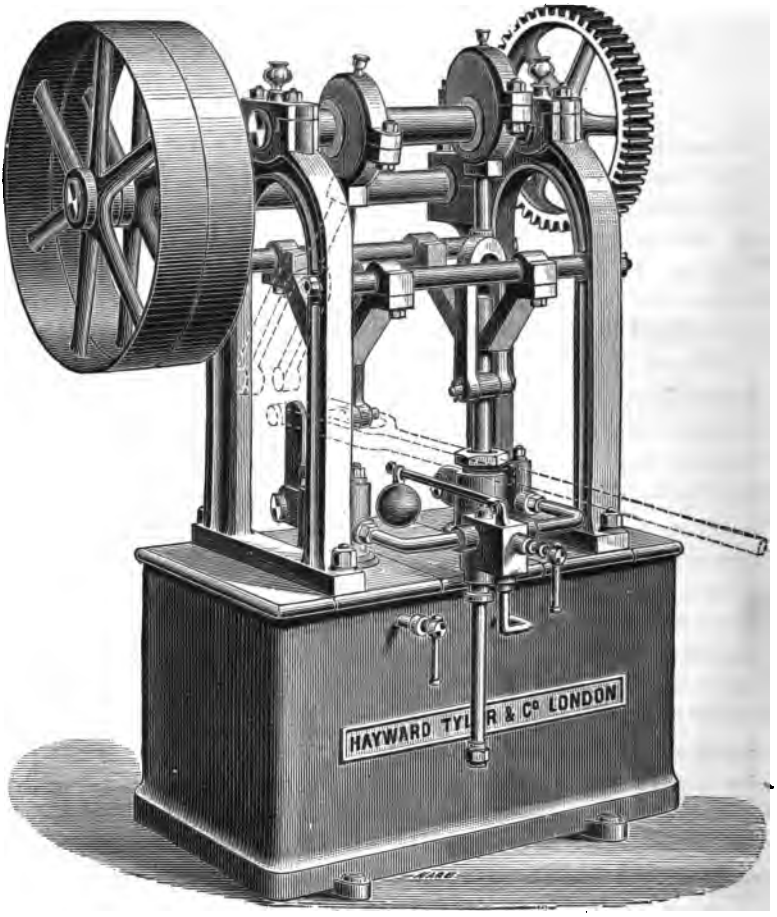
It will be seen that as long as the pressure in the cylinder is less than that due to the weighted lever acting on the pump, the lever will fall at each stroke, and continue pumping into the cylinder; but when the required pressure is attained, the lever is balanced by the pressure, and unable to fall, and so remains suspended at the top of its stroke—the crank, or cam, continuing to revolve underneath it. As soon as the material gives way in the least, the lever again falls, and is raised again by the cam, until the balance is restored.

The machine is all of the very strongest construction, and is provided with relief valves, &c., complete.

The hand-pump may, of course, be omitted: and, instead of a single pump, two or more pumps may be placed side by side, each worked with its own cam and lever.

Price of machine as shown with 1 & 2 inch pumps	£
Packing extra	£5 per Cent.
Approximate weight	16 Cwt.
Approximate shipping dimensions	90 Cubic feet

HYDRAULIC PRESS PUMPS FOR STEAM POWER, &c.


HAYWARD TYL R & Cº LONDON

For working large Hydraulic Presses, or ranges of presses, or hydraulic cranes and lifts, a very convenient arrangement is to have one, two, or three pumps placed on a cistern, and driven by means of cranks or eccentrics, and geared wheels. This arrangement is very compact, self contained, very strong and convenient in work.

The details vary according to the special circumstances: thus, it is sometimes preferable to drive by means of a crank, and sometimes by eccentrics as shown; sometimes instead of driving by a band, the engine cylinder is made part of the machine, &c., &c.

The arrangement shown in engraving has two pumps, one for speed and the other for power. When the pressing operation commences, both pumps are allowed to work, and so the ram is raised rapidly, but, when the pressure becomes too great for the larger pump, it is thrown out of work by means of the relief valve in front of the cistern, and the smaller pump completes the operation.

The pumps are provided with safety valve, relief valve, &c. They are of the most approved construction and all the machine is very strongly and accurately made.

HYDRAULIC PRESS PUMPS, FOR STEAM POWER (CONTINUED.)

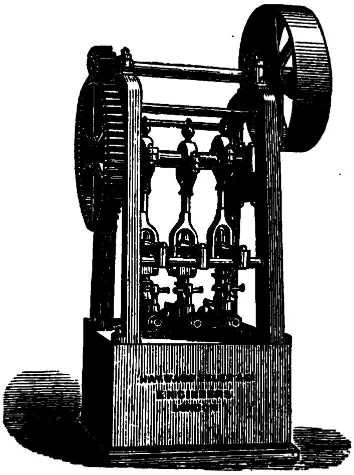
A special arrangement is made by which either pump can be immediately disconnected from the gearing and worked by a hand lever, as shown in dotted lines. This is found in practice a very great convenience as the pumps can then be worked at any time if required when steam is not up, or if the other machinery is stopping from any cause.

These pumps (in connection with our small steam engines, or horse and bullock gear), are specially recommended for Home and Foreign Wharves, Factories, &c., &c.

Dimensions and Prices of Hayward Tyler & Co.'s Hydraulic Press Pumps, on strong cisterns, with eccentric driving gear, and suited for driving by power. All are provided with safety and discharge valves, &c., complete.

All are suited for working at 2 tons per circular inch.

Single Pump, 1 inch or less, geared with wheel and pinion, and fast and loose driving pulleys	£40	0	0
Extra for hand working arrangements as alternative to steam power	£2	10	0
Approximate weight, 9 cwt.			
Approximate shipping dimensions, 32 cub. feet.			
Double Pumps, ½ inch or less	£55	0	0
Double Pumps, 1 and 2 inch (or both 1 inch)	£70	0	0
Double Pumps, 1½ and 2¼ inch (or both 2 inch)	£75	0	0
Extra for hand working arrangement	£3	0	0
Packing extra	£2	10	0
Approx. shipping dimensions, 40 cub. ft. Approx. weight, 14 to 16 cwt.			
Double Pumps, 1 inch or less ; without gearing	£52	10	0
Approx. shipping dimensions, 36 cub. ft. Approx. weight, 12 cwt.			
Double Pumps as above, with steam engine complete, with governor, &c., on same cistern serving as bed plate	£105	0	0
Packing	£3	10	0
Approximate weight, 25 cwt.			
Approximate shipping dimensions, 60 cub. ft.			



TREBLE HYDRAULIC PRESS PUMPS,

½ inch diameter, 3 inch stroke.

On strong cisterns and frames, complete with safety-valves, stop-valves, fast and loose pulleys, &c., pumps driven by eccentrics direct from shaft.

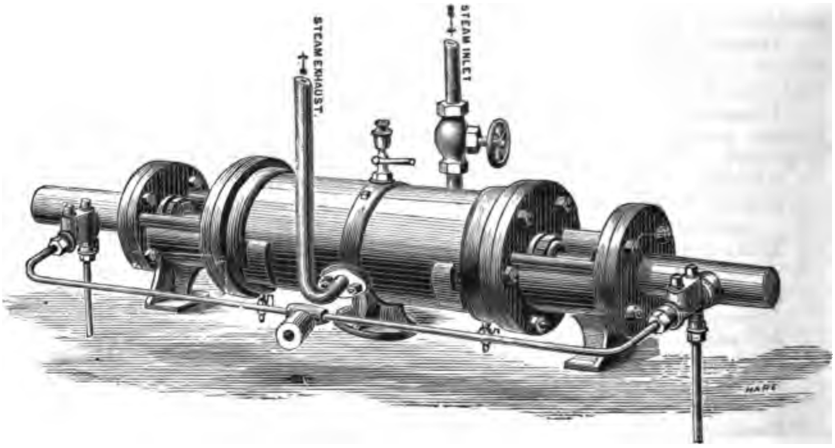
Price ... £60. Packing extra ... £2 2s.
Weight ... ...

Set of these Pumps, 1-in. diameter, on strong cisterns and frames, complete with safety-valve, stop-valve, fast and loose pulleys, &c. Pumps driven by eccentrics on counter shaft with wheel and pinion gearing. A very strong and substantial machine, £85; packing extra, £3 10s. Weight, abt. 20 cwt. Dimensions, packed, about 60 cub. feet.

Treble Pumps 1 inch, or less, without gearing £75

Set of these Pumps, 1-inch diameter, on strong cistern and frames, &c., complete with steam engine in same frames, with governor, &c., £125.

HAYWARD TYLER & Co.'s PATENT "ACCUMULATOR" PUMP, OR DIRECT-ACTING STEAM PUMP FOR HYDRAULIC PRESSES, LIFTS, &c.



In almost all work performed by Hydraulic Presses, the power required to be exerted at different parts of the stroke of the ram varies considerably. At the beginning the work is generally very light, and it is not until nearly the end of the stroke that the full power of the press is required to be exerted. It is generally desirable to get through the process of pressing as rapidly as possible, so that the press may be used the greatest possible number of times in the day. If a press of large diameter is used, the time taken in pumping up is of course great, and hence it is often needful to sacrifice *power* to speed of working, unless some efficient means can be found to combine both.

Various methods have therefore been employed for getting as speedily as possible over the first part of the pressing, and holding power in reserve for the end. For this purpose, pumps of different sizes are sometimes employed; larger pumps for "speed" at the first, and smaller pumps for "power" at the end.

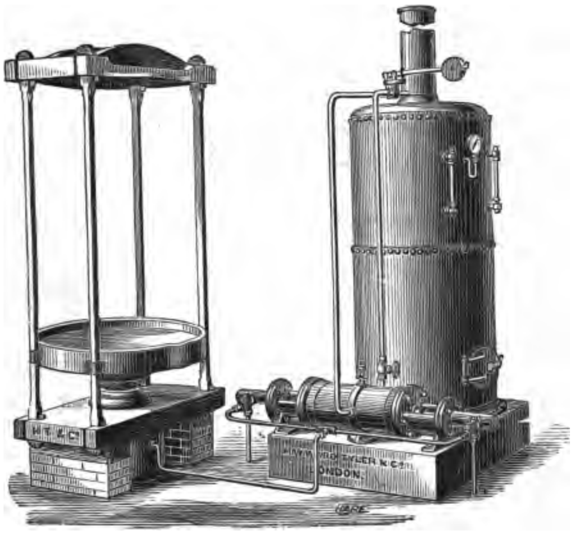
The "Accumulator" or weighted cylinder, (see p 91), is a valuable means for *rapid* working, and the differential Accumulator (see p 93), is a useful device for getting great power out of a moderate pressure of water. But these arrangements are unavoidably expensive, and require both considerable outlay of capital, and ample room for working; while the effect of both these machines combined, is obtained in the simplest possible way by the "Accumulator Steam Pump," which is so adjusted to its work that it runs at a speed exactly proportioned to the work that has to be done. While the pressure is *light* at the beginning of the stroke of the press, it runs at a very high speed, then very rapidly raising the ram, and as the pressure increases, the speed of the pump gradually decreases until the exact pressure required is reached, when it ceases working.

The "Accumulator Pump" possesses several great advantages in addition to the rapidity of its working. It can be exactly proportioned to its work, so that it cannot possibly exceed the pressure to be given, and at the same time it *automatically keeps up the pressure,* a most important point (as has been already pointed out in describing another form of press pump, see p. 85). When the pressure in the press diminishes owing to the charge becoming compressed, it is not needful for an attendant to be at hand to start the pumps again, for the moment the balance of pressure is altered, they start of themselves and work until the balance is restored.

The "Accumulator Pump" is most simple and compact. It consists of one of Hayward Tyler & Co.'s Direct-Acting Steam Pump Cylinders, with a horizontal press pump of the best construction at each end. The piston rod of the cylinder projects at each end, and is lengthened to form the plunger, or piston of the pump. Thus, the force of the steam acts directly on the pump, and scarcely anything is lost by friction and nothing by gearing. The areas of the piston and the pump can be exactly proportioned, so that at any given pressure of steam a certain fixed maximum pressure is produced by the pump.

At one of the principal Breweries at Burton-on-Trent, it is found that one of Hayward Tyler & Co.'s Hop Presses (see p. 49), worked by one of their Accumulator Pumps, will do nearly three times the work of a press and pumps of the old types. Some of these pumps have been at work for years past and scarcely require any attention.

Owing to their compactness and light weight compared with weighted accumulators, they are particularly adapted for Export or Colonial work; the whole machine is absolutely self-contained, requiring nothing in addition beyond the steam boiler. Thus, all gearing, shafting, &c., is unnecessary, and the best results can be obtained at a most moderate outlay. The engraving below shows one of these pumps attached to one of Hayward Tyler & Co.'s Olive Presses, as used in Spain. (see p. 59).

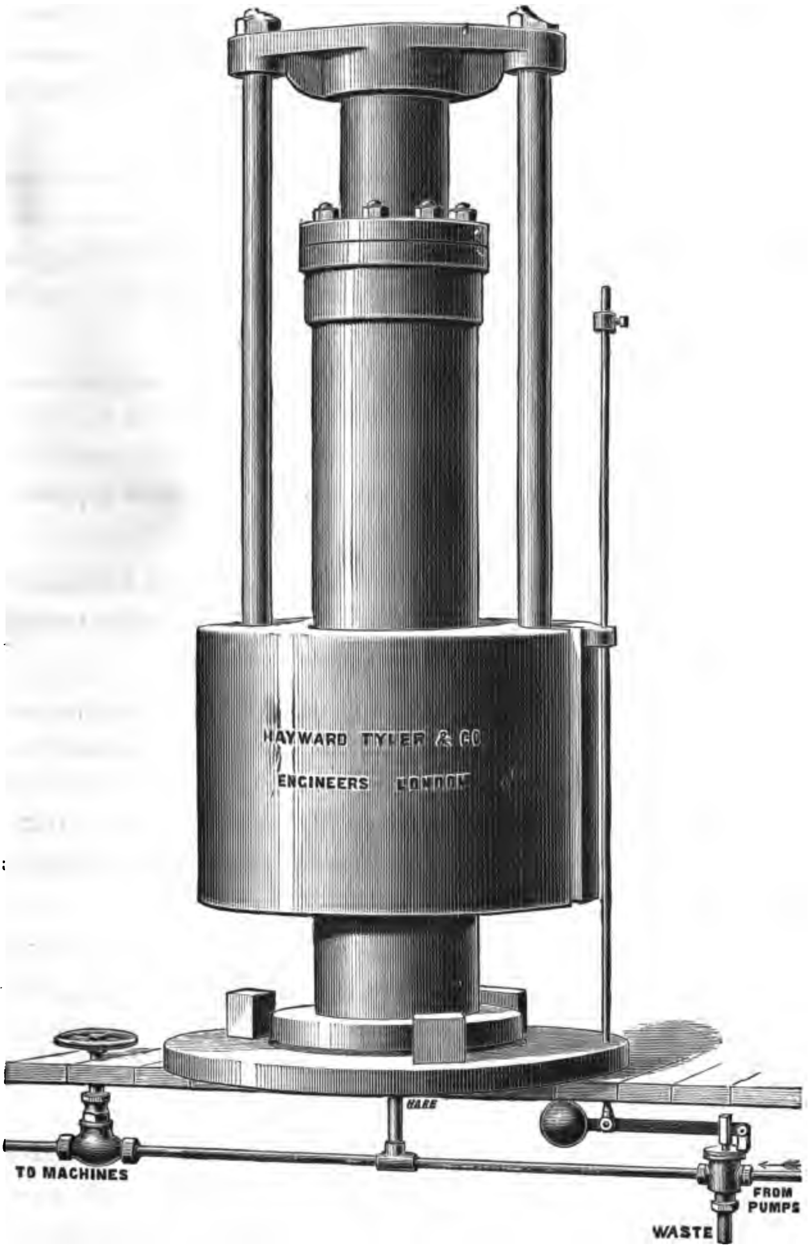


SIZES AND PARTICULARS OF SOME OF THE MOST USUAL FORMS OF THE "ACCUMULATOR STEAM PUMP."

Prices of Pumps include copper junction pipe for the Pumps, but no steam or exhaust pipe or admission valve. Prices with boiler include needful steam and exhaust pipes.

Diam. of Steam Cylinder	Diam. of Pumps	Pressure per sq. in. produced at 60 lbs steam	No. of Gallons per minute at 80 strokes	Approx. weight of Pump only	Approx. Shipping dimensions of Pump only.	Price of Pump without Bedplate, delivered in London, not packed.	Approx. weight of Pump, & suitable boiler and pipes, feeder, and Bedplate	Approx. Shipping dimensions of pump, boiler, &c.	Price of Pump, boiler, & pipes, with boiler feeders	Boiler Horse Power
Inches	Inches	Lbs.		Cwt. qrs. lbs.	Ins. Ins. Ins.	£	Cwt. qrs. lbs.		£	Horse Power
7	⅝	5,760	1·16	3 ″ 1 ″ 0	70 × 16 × 16	56	32 ″ 1 ″ 0	About 93 cub. ft.	142	5
7	¾	3,900	1·72	3 ″ 2 ″ 0	70 × 16 × 16	58	32 ″ 2 ″ 0	do.	144	5
7	1	2,220	3·03	3 ″ 3 ″ 10	70 × 16 × 16	62	33 ″ 0 ″ 0	do.	148	5
9	¾	6,480	2·20	5 ″ 0 ″ 0	76 × 18 × 18	74	42 ″ 3 ″ 0	About 128 cub. ft.	186	7
9	1 3/16	2,580	4·8	5 ″ 2 ″ 9	76 × 18 × 18	79	43 ″ 1 ″ 9	do.	192	7
9	1¼	2,400	6·00	5 ′ 3 ″ 0	76 × 18 × 18	82	43 ″ 3 ″ 0	do.	195	7
12	1 3/16	4,620	7·25	11 ″ 2 ″ 0	82 × 20 × 20	105	53 ″ 1 ″ 0	About 155 cub. ft.	220	8
12	1½	3,000	11·3	12 ″ 2 ″ 0	82 × 20 × 20	120	54 ″ 1 ″ 0	do.	235	8
12	2	1,620	20·6	15 ″ 0 ″ 0	106 × 30 × 30	140	57 ″ 0 ″ 0	About 190 cub. ft.	260	8

THE "ACCUMULATOR."



THE "ACCUMULATOR."

One of the greatest conveniences that has been introduced into the working of Hydraulic Machinery since the first invention of the Hydraulic Press, is the *Accumulator.* It generally happens with most processes performed by hydraulic pressure, that the full work is only required at intervals, and in the meantime the pumps and machinery were originally obliged either to stand still or to work to waste.

The object of the accumulator is to accumulate or store up the work of the pumps during all the intervals when the presses are not working, in such a way that the power then stored up may be immediately available when wanted. In this way the press or presses can work much more rapidly with much smaller pumps then would otherwise be needed.

The Accumulator consists of a vertical cylinder and ram, the former containing fully the quantity of water required for one operation of all the presses or machines that are likely to be wanted together. The Ram is attached to weights sufficiently heavy to produce in the cylinder the pressure per square inch at which the machines are to work.

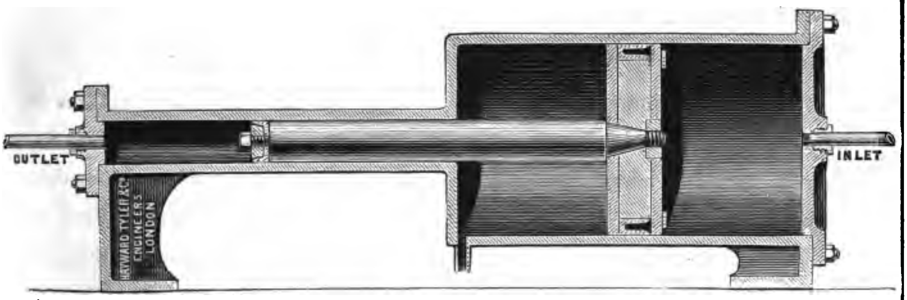
These weights, in small accumulators, consist of iron or lead, but in larger machines it is usual to construct a platform or tank, and produce the required weight by brickwork, sand, or other cheap and heavy material.

By means of the accumulator, one set of pumps constantly working can supply a large range of presses or hydraulic machines; and the pressure from the accumulator is a steady pressure, not in any degree intermittent as is the case with all forms of pumps working directly into the press cylinders. It also ensures safety in working, as the excess pressure escapes when the ram is pumped up to its highest limit.

The accumulator is also very useful for storing hydraulic pressure for other purposes, as for instance, for testing boilers, pipes, water fittings, or any other manufactures in which a pressure of water is required. The operation of testing can thus be performed much more rapidly than when the pressure is pumped up for each operation.

The accumulator can be made in any size required. The engraving is taken from a very useful form of the Machine made by us for testing hydraulic work. Price, £25 0 0 Weight of the machine, about 14 cwt. Full particulars of other forms given as required.

THE "DIFFERENTIAL ACCUMULATOR."



The **Differential Accumulator**, is a variation of the principle of the Accumulator, by which the power may be increased to any given extent. The Differential Accumulator has two pistons, of different sizes, attached to the two ends of the same rod. The pistons work in cylinders placed in the same line. The pressure of the water in the larger cylinder is communicated by the larger piston to the smaller piston, and thus the pressure per square inch is increased in the inverse proportion of the difference of their areas. Thus, supposing the larger piston to be 10 inches in diameter, and the smaller one 4 inches, their areas will be in the proportion of 100 to 16. If there be a pressure of 700 per square inch in the larger one, it will be concentrated in the smaller one, and produce a pressure of 4375 per square inch in the smaller cylinder. In this way a very high pressure can be produced without needing to work the pumps at more than a moderate pressure. It is also a convenient means of producing a great pressure for the last part of the process of pressing.

HYDRAULIC TESTING MACHINERY.

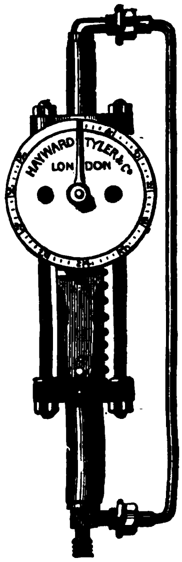
There can be little doubt in any mind of the great importance both to the producer and the user of materials such as cast or wrought-iron, &c., of having some means of knowing easily and precisely the strength of these materials, according to the work which they have to do, namely, as the strain to which they will be exposed in work, is one of tension, compression, or torsion.

Although the importance of this is readily conceded, theoretically, there is no doubt that in England both producers and users have hitherto been remarkably backward in adopting to any general extent testing machinery for this purpose. In this respect they are very far behind their neighbours in France, &c. This backwardness may have had no very injurious effect upon the English trade, while orders were obtained faster than they could be executed; but of late years the producer has found that he is exposed to dangerous competition from other countries, and unless he determines to conduct his business with all the scientific aids which his neighbours possess, he will most certainly be left behind in the race. The consumer on the other hand having now a choice of materials from different quarters offered to him, needs suitable means of determining which of them possesses the best working qualities. The importance of handy testing machinery in large works cannot be overrated, much expence might be saved and many blunders avoided if the manager had always at hand the means of determining by actual experiment what material was suitable for any given purpose; while, if the same means were used at Blast Foundries and Rolling Mills the customer would be saved the unpleasant discovery that metals bearing the same brand often differ so widely at different times as to be quite unsuitable for the same work.

Acting on the above considerations, we have thought that we should be doing a service to our friends and customers throughout the country in bringing under their notice, in addition to our own machines, the simple and beautiful apparatus for testing materials, which is in general use throughout France, and by means of which all questions of strength of materials can be readily transferred from the region of theory to that of experiment.

We have undertaken the Sole Agency for England for these machines, and shall be happy to answer any inquiries respecting them.

HYDRAULIC PRESSURE GAUGES.



Hayward Tyler & Co's Differential Pressure Gauge, for Hydraulic Presses.

This is a very accurate and durable Gauge. The Action is obtained by two pistons of different sizes acting in opposite directions on a strong spring, the effective area being the difference between their respective areas. By this arrangement the objections to single-piston gauges are overcome and the instrument can be relied on for accuracy. Every gauge is graduated by actual experiment on the apparatus described on page 80, and carefully checked by calculation. The highest pressure reached is indicated by a loose hand on the dial.

Price complete in box with glass face, £7 7 0

Hayward Tyler & Co's Direct-Acting Pressure Gauge for Hydraulic Presses.

This is a very useful Gauge for general purposes, although not so accurate as the Differential Gauge, owing to the smaller size of the piston in proportion to the spring. Each Gauge is tested in the manner described above.

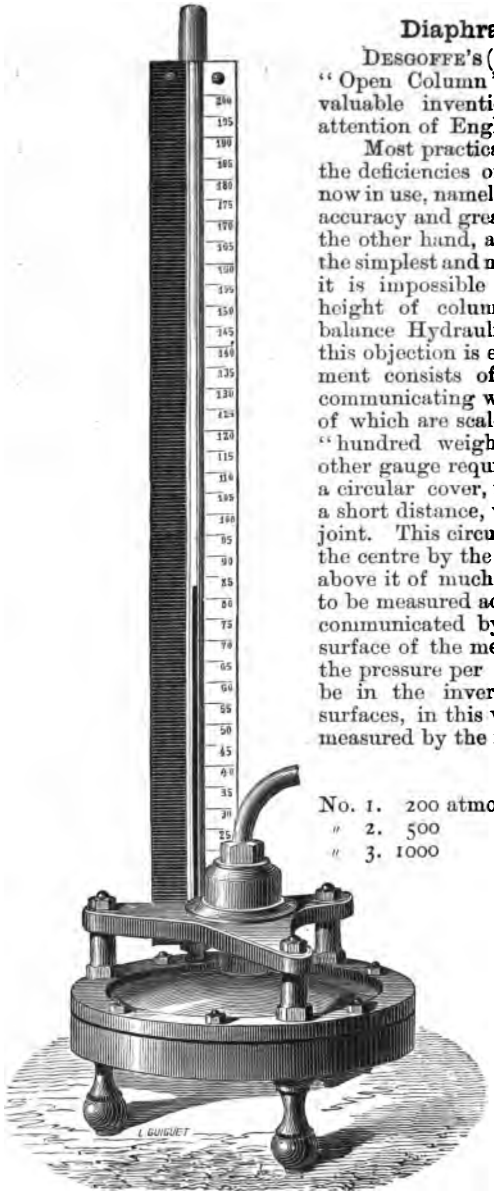
Price of Gauge with Graduated Scale Face, in box, with glass front £4 4 0

Naylor's Patent Hydraulic Pressure Gauge.

Complete in Mahogany Case £12 0 0

HYDRAULIC PRESSURE GAUGES.

DESGOFFE'S PATENT.



Diaphragm Pressure Gauge.

Desgoffe's (otherwise known as Thomasset's) "Open Column" Pressure Gauge is a very valuable invention and well worthy of the attention of English users of Hydraulic Power.

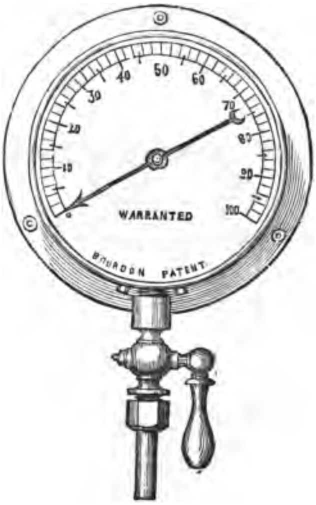
Most practical men are well acquainted with the deficiencies of many of the Pressure Gauges now in use, namely, want of sensitiveness, want of accuracy and great liability to derangement. On the other hand, although a column of mercury is the simplest and most correct indicator of pressure, it is impossible to use it owing to the great height of column that would be required to balance Hydraulic Pressure. In this invention this objection is entirely overcome. The instrument consists of a circular bath of mercury communicating with an open column, at the sides of which are scales graduated to "atmospheres" "hundred weights per circular inch" or any other gauge required. The bath of mercury has a circular cover, moving freely up and down for a short distance, with an india rubber diaphragm joint. This circular cover is acted on exactly in the centre by the piston rod of a cylinder placed above it of much smaller diameter. The pressure to be measured acts on this smaller piston, and is communicated by the piston rod to the larger surface of the mercury bath. It is evident that the pressure per square inch on this surface will be in the inverse proportion of the relative surfaces, in this way it comes within limits to be measured by the mercury column.

PRICES.

No. 1.	200 atmospheres	£7 15 0		
" 2.	500 "	£12 0 0		Packing 5%
" 3.	1000 "	£16 16 0		

HYDRAULIC TESTING MACHINERY.

PRESSURE GAUGES.



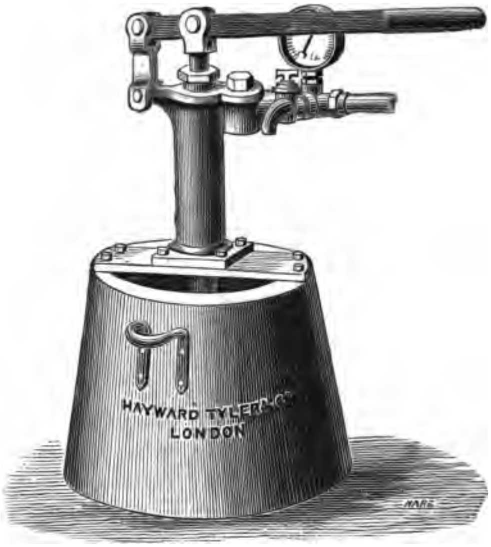
For very high pressures it is needful to use Gauges of the class described on pages 95 & 96, but for pressures up to 1000 lbs. on the square inch, it is possible to use Dial Pressure Gauges of the class illustrated above; those which we use are of the most approved construction and of great accuracy. In a careful test made by the Engineers of the Royal Agricultural Society in 1870, our gauges were found to be the most correct on the Show Ground.

Diam. of Face	Graduated to lbs. per square inch.										Price
Inches											
3	100	200	300	400	...	...	...	...	...	...	17/6
4	100	200	300	400	500	...	...	...	...	...	17/6
5	100	200	300	400	500	600	...	...	...	...	20/-
6	100	200	300	400	500	600	700	800	900	1000	25/-
7	100	200	300	400	500	600	700	800	900	1000	29/-
8	100	200	300	400	500	600	700	800	900	1000	34/-
9	100	200	300	400	500	600	700	800	900	1000	45/-
10	100	200	300	400	500	600	700	800	900	1000	54/-
11	100	200	300	400	500	600	700	800	900	1000	72/-
12	100	200	300	400	500	600	700	800	900	1000	90/-

Delivery in London. Packing extra.

HYDRAULIC TESTING MACHINERY.

HYDRAULIC PROVING PUMP.



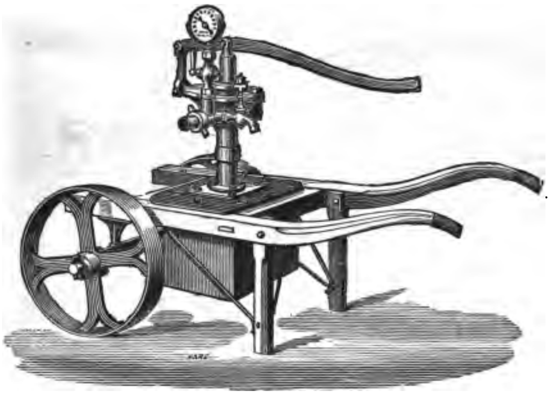
The engraving shows our Portable Hydraulic Proving Pump, for testing boilers, pipes, or other work, mounted on a strong portable iron pail, holding 5¾ gallons, with discharge cock, union and pressure gauge, forming a most convenient pump for general use. It is provided with a gauge to test up to 200 lbs. per square inch.

Price … … … … … … … … … … … …	£6 6 0
Do. to prove to 500 lbs. … … … … … … …	8 0 0

This pump is also suited for supplying boilers in case of the feed-pump being out of order.

HYDRAULIC TESTING MACHINERY.

PORTABLE HYDRAULIC PROVING PUMP.



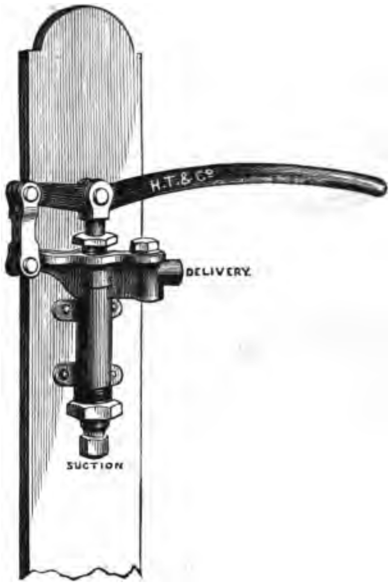
A very strong and compact Proving Pump, complete with discharge cock, union and pressure gauge, mounted on a barrow with a wrought-iron tank for supply. The Pressure Gauge is graduated to 300 lbs. on the square inch.

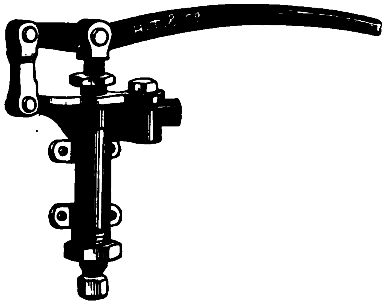
Price £10 10 0

This Pump may also be used for feeding boilers in case of emergency.

HYDRAULIC TESTING MACHINERY.

HYDRAULIC FORCING PUMPS,
ALSO SUITED FOR BOILER FEEDING.





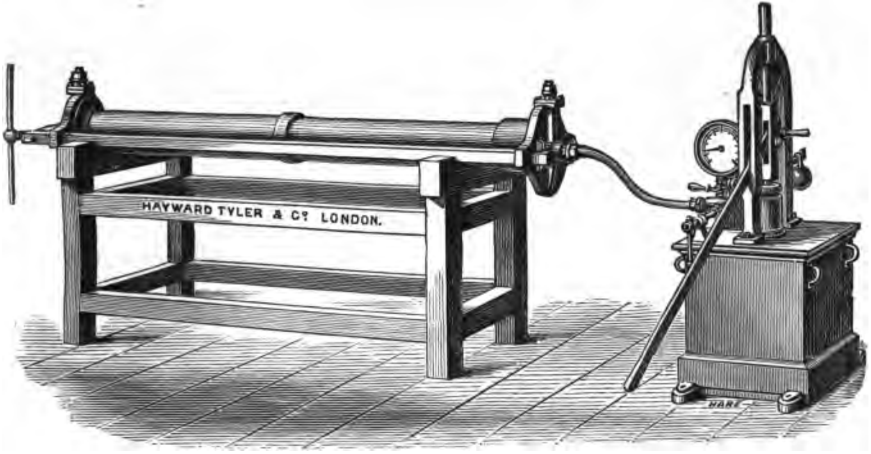
The above are a very strong pattern of Gun Metal Pumps, designed and made by us for various purposes requiring high pressures, such as testing boilers or pipes, working presses at moderate pressures, &c., &c. They can also be used as boiler feeders, for which purpose they are particularly adapted. They are provided with strong wrought-iron handles, and the suction and delivery pipes are screwed for wrought-iron pipe.

	Without Plank	With Plank.
With Plunger 1 inch diameter	50/-	58/-
〃 1½ 〃 〃	80/-	88/-

HYDRAULIC TESTING MACHINERY.

HYDRAULIC PIPE PROVING APPARATUS.

FOR PIPES UP TO 12 INCHES IN DIAMETER.



The apparatus represented above consists of two cast-iron ends with filling arrangement, cross-head, and tightening-screw, &c., on side bars adjustable to different lengths of pipe. The whole is mounted on a strong wooden frame.

Price without Pump or Pressure Gauge	...	£10 10

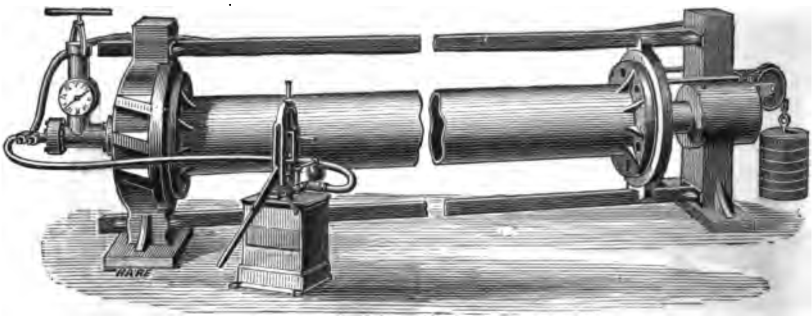
This apparatus is suited for use with any of our Hydraulic Proving Pumps described in this Catalogue. That shown in engraving is only needed for very high pressures.

Pump as shown (See page 77)	£18	0	0
Pump on portable iron bucket (See page 98)	£ 8	0	0

For pressure gauges see pages 95, &c.

HYDRAULIC PIPE PROVING MACHINE,

TO TEST PIPES UP TO 20 INCHES IN DIAMETER, OR LARGER IF REQUIRED.



The above illustration shows a machine which we have designed and made for proving pipes of large size. The pipe is rolled into its place along horizontal beams, and is then held tightly by the press cylinder shown at the right hand. At the other end is the arrangement for filling with water and the pressure gauge. The same pump, by means of suitable stop valves, works the press which holds the pipes in their place, and also produces the pressure for proving. When the pressure from the cylinder is released, the ram runs back by counter weights and lets the pipe go. The whole forms a most complete and convenient machine.

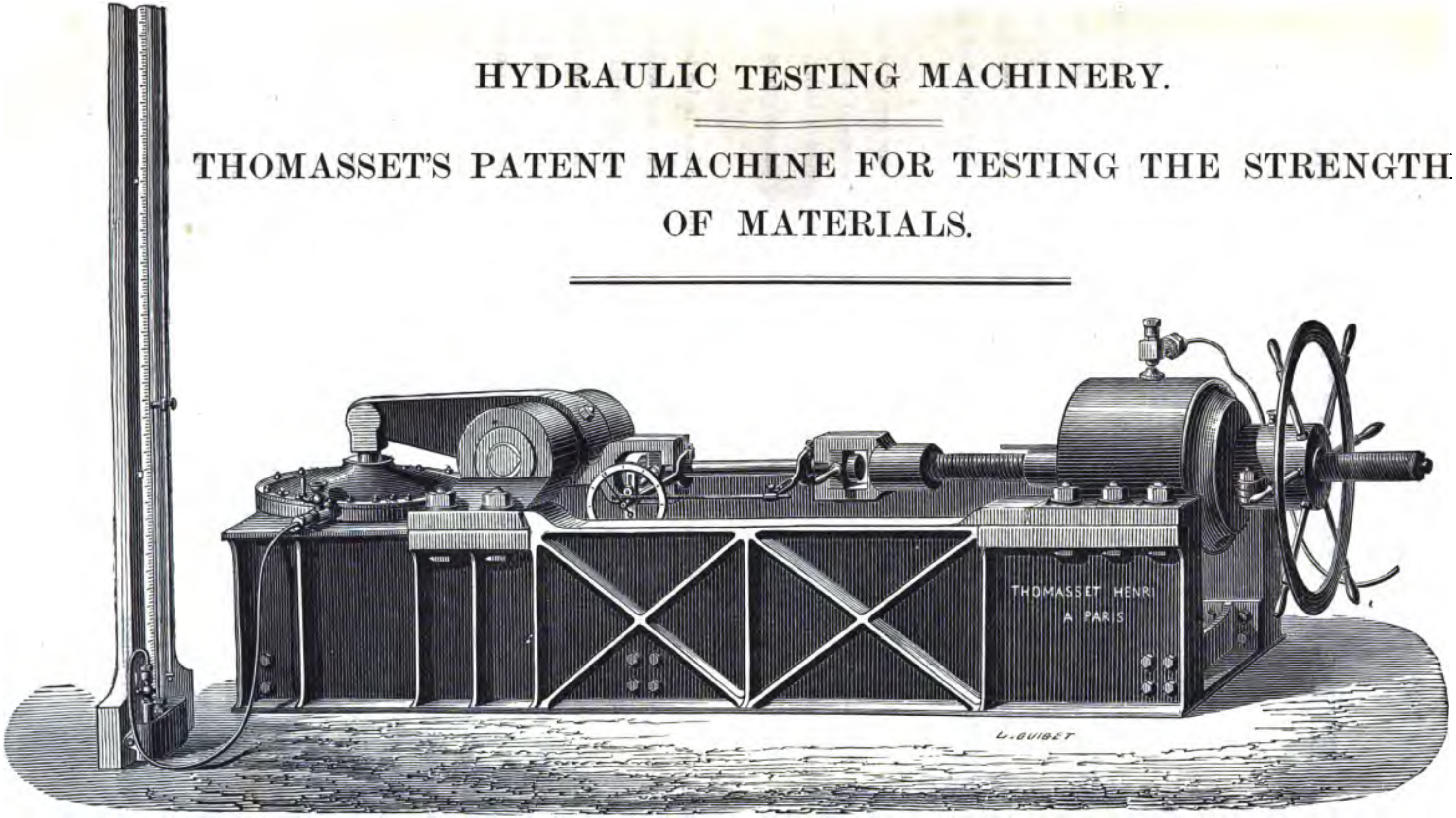
For high pressures a pump of the Bramah Pattern as shown in engraving is desirable; for lower pressures a cheaper form can be used.

Price of machine, to test to 500 lbs. pressure, pipes 12 feet long, up to 20 inches in diameter (without pump or pressure gauge)	£70 0 0
Weight about 38 cwt.	
Pump as shown *(See page 77.)*	£18 0 0
Pump on portable iron bucket *(See page 98)*	£ 8 0 0

For pressure gauges see pages 95, &c.

HYDRAULIC TESTING MACHINERY.

THOMASSET'S PATENT MACHINE FOR TESTING THE STRENGTH OF MATERIALS.



HYDRAULIC TESTING MACHINERY.

Thomasset's machines for testing the tensile strength of materials consist of a Hydraulic Press and a continuous-acting Pump, similar to those used in Desgoffe's compound presses, already described in this work (and to which the makers give the name "Sterhydraulic"), suitable jaws for holding the pieces to be tested, a lever for communicating the resistance, and a mercurial pressure gauge as already described on page 96; the principal parts being mounted on one bed-plate.

The press is horizontal, and its piston is traversed by a strong screw, which connects it with one pair of the jaws. This screw, which by means of a strong nut worked by a hand-wheel behind the piston, can be lengthened or shortened, serves to regulate the position of the jaws to suit the varying length of the bars to be tested.

The second pair of jaws which seizes the other end of the bar to be tested acts by a knife edge bearing on the short arm of an L shaped lever which is also mounted on knife edged steel bearings, and the larger arm of which acts at its extreme end upon the centre of a piston, or circular plate, resting upon a bath of mercury. A diaphragm of india-rubber prevents the escape of the mercury, and enables the slightest movement of the plate or piston resting on it to be transmitted to the mass. This bath of mercury is in communication with an open column, provided with suitably graduated scales at the sides, and thus the slightest variation of pressure on its surface results in raising or lowering this column, and so exhibiting itself to the operator. The compressor or continuous pump which works the hydraulic press, consists of a vertical frame with a hydraulic cylinder, a piston enters this cylinder and compresses the water which is contained in it. The movement of this piston is obtained by a long screw, which passes inside it, and the head of which is provided with a worm wheel, operated by two worm shafts, each provided with a hand wheel.

It will be readily understood that as this piston is smaller in area than the ram of the press it produces a power increased in the direct proportion of their areas, and this power is further increased by the screw arrangement, so that one man can easily produce a pressure of 500 atmospheres (3⅓ tons per square inch). The pressure has the additional advantage of being perfectly *continuous*—a most important point in testing, and one not attained by any other system in use except the accumulator. *(For Illustration of Compressor, see next page.)*

Finally—in order to prove not only the pressure which the material will stand, but the exact amount of stretching which takes place before the final rupture, there is placed by the side of the test Bars a delicate apparatus, which will, if needful, register any change of length to one thousandth of an inch.

This complete and excellent machine is made in four sizes.

				Weight approx.
No. 1,	with power of	5 tons	£ 96	20 cwt.
" 2,	" "	25 "	£195	36 "
" 3,	" "	50 "	£240	44 "
" 4,	" "	100 "	£390	60 "

Delivery in London, packing 2 to 4 per cent. extra.

There is also made a powerful machine for testing the resistance of metals to both compression and tension. The principle of working is similar to that last described, but the adjusting screw is placed at the end opposite the cylinder. There is an open column gauge, as above described, to measure the pressure in the compressor, and another, acted on by a lever on the right-hand side of the machine to indicate the actual pressure exerted.

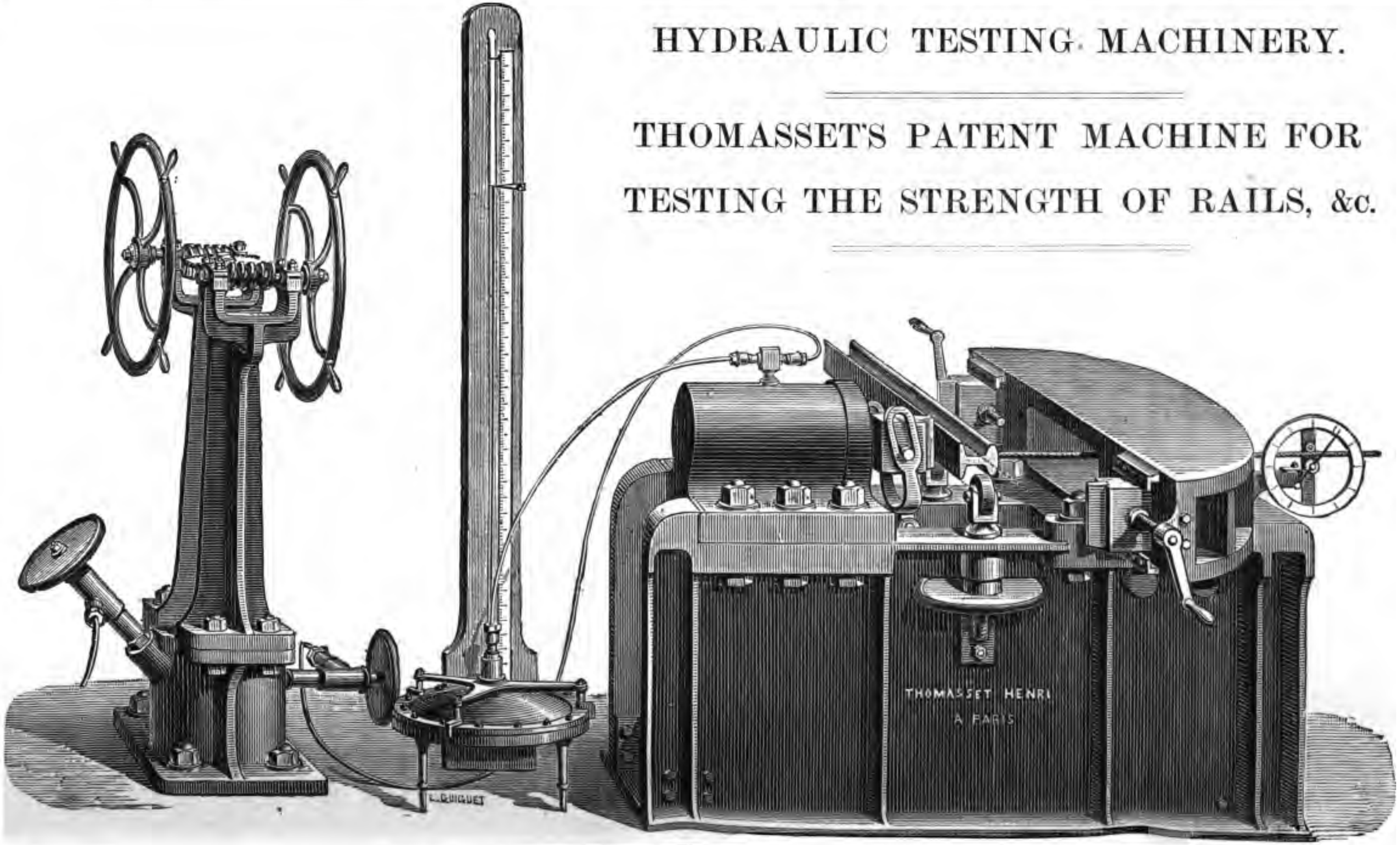
These machines are made in two sizes.

Power 50 tons	weight 3 tons	Price £385
" 100 "	4 tons 16 cwt.	" £530

Packing about 2 per cent.

HYDRAULIC TESTING MACHINERY.

THOMASSET'S PATENT MACHINE FOR TESTING THE STRENGTH OF RAILS, &c.



HYDRAULIC TESTING MACHINERY.

M. THOMASSET'S MACHINES FOR TESTING THE STRENGTH OF RAILS, &c.

The accompanying engraving shows one of M. Thomasset's Patent Machines for testing the power of rails, &c., to resist bending strains. The pressure is applied by a "Compressor" or continuous hydraulic pump, consisting of a vertical cylinder into which a piston is forced by means of a screw worked by a worm wheel and two worms provided with hand wheels, as described in a former page. An open column pressure gauge (see page 96) measures the pressure applied, and a very delicate arrangement indicates on the dial at the right of the machine the precise amount of flexion as the pressure proceeds. By this machine the strength of the material can be tested more exactly than by any arrangement acting with an intermittent pump.

Power of the above Machine	50 Tons.
Distance of the blocks against which the rail is pressed is variable at pleasure from	36 to 41 Inches.
Weight of the Machine	2½ Tons.
Price	£240 0 0

The following are some of the places where Thomasset's various Testing Machines are in use in France and Belgium, &c.:—

Government Foundries at Nevers and Bourges.

Government Workshops at Tarbes and Vincennes.

Railway Companies: Ouest, Nord, Orléans, Dombes.

Forges and Rolling Mills: Gorcy, Phénix, Commentry, Chatillon, Anzin, Vieux Condé.

Steel Works: Unieux, Angleur, (Belgium,) Ruhrort, (Rhine,) Firniny.

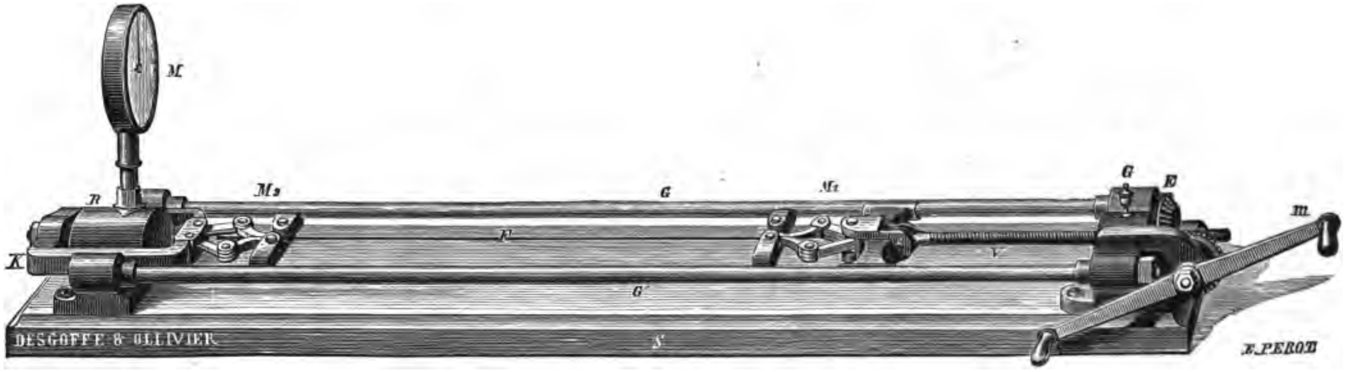
Foundries and other Works: l'Aveyron, Revollier & Cie., Cail, Halot & Cie. (Brussels,) &c., &c.

French Telegraphs, Spanish Telegraphs, Bank of France, Bank of Rome, Bank of St. Petersburg.

Paper Mills, etc.: Firmin, Didot & Cie., du Marais, des Gorges, &c., &c.

TESTING MACHINERY.

MACHINE FOR TESTING METALLIC WIRES, RODS, STRIPS, &c.

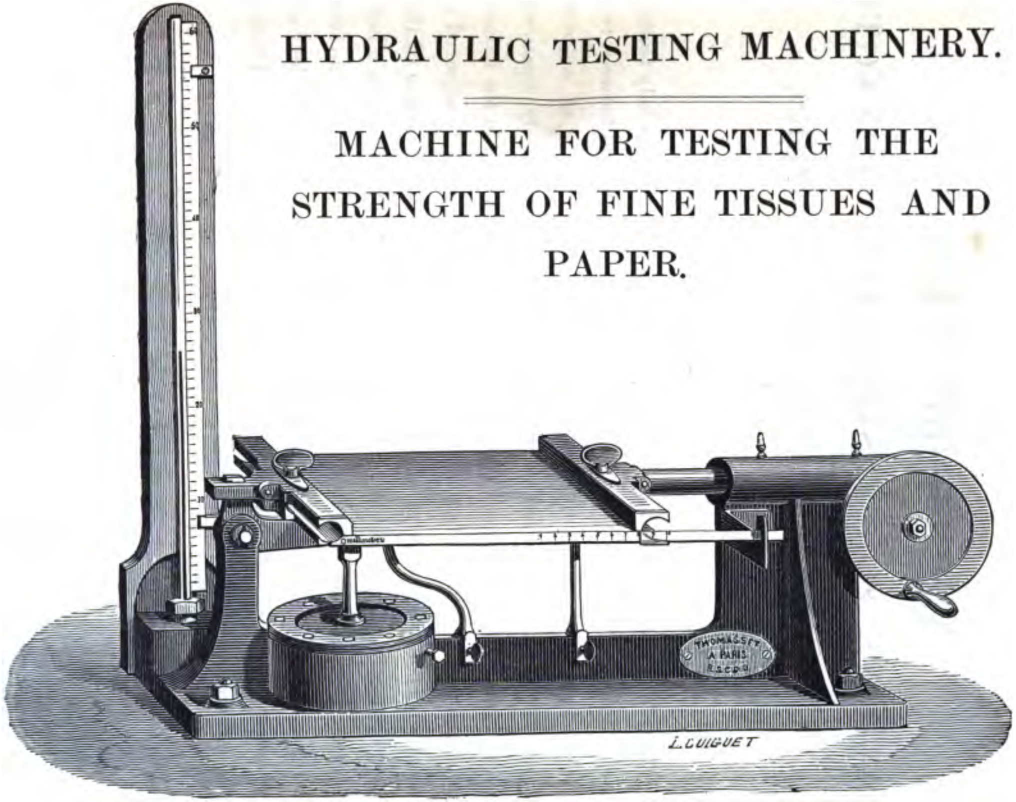


The above illustration shows a machine for accurately testing the breaking strain of wires, &c. The wire is held between two self-acting jaws, and the pressure is applied by a finely pitched screw. By this means the exact amount of stretching that takes place before fracture is observed. The pressure applied is indicated by means of a Hydraulic Cylinder, and either a Dial Gauge or an open Column Pressure Gauge (see page 96.) This is a machine of great accuracy and delicacy, but very simple and easy to work and not liable to derangement. The length of the piece tested is about a yard.

Power of Machine, 1 ton.	Weight about, 5 cwt.	Price £60
Power of Machine, 5 tons.	Weight about, 8 cwt.	Price £100

HYDRAULIC TESTING MACHINERY.

MACHINE FOR TESTING THE STRENGTH OF FINE TISSUES AND PAPER.



TESTING MACHINERY.

THOMASSET'S PATENT MACHINE FOR TESTING THE STRENGTH OF FINE TISSUES AND PAPERS.

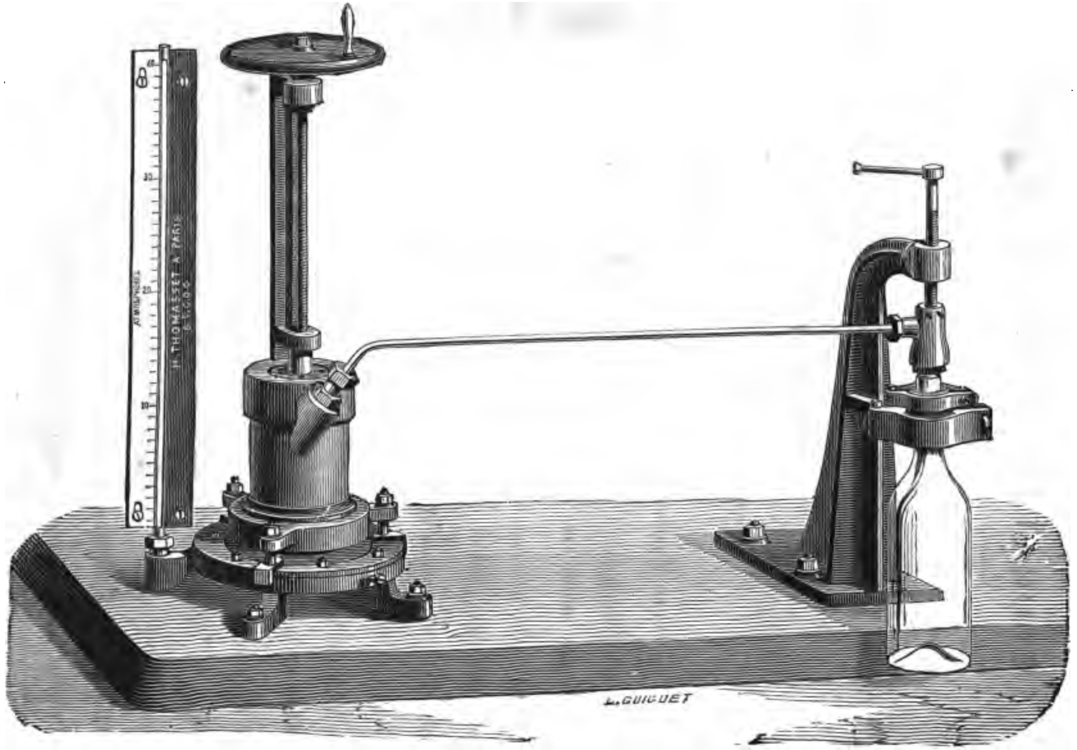
The above is a very beautiful and accurate instrument for precisely testing the strength of Papers or Fine Tissues. The paper, &c., is held between two suitable clips and the pressure is applied *continuously*, by means of a screw arrangement. The elongation of the paper or tissue is precisely measured on a delicate scale at the side. The pressure applied is indicated in the following manner:—one of the clips which holds the tissue is accurately adjusted to bear against the shorter arm of an L shaped lever. The other arm of this lever is connected by means of a spindle with a circular plate covering a bath of mercury which communicates by a pipe with an open column at the side, and so arranged that the slightest pressure displaces the mercury in the bath and causes it to rise in the column. The side of the column is graduated to the exact pressures which are thus indicated with the greatest precision.

Price of the above Machine, large size	£17 0 0
" " small size	£10 0 0

Testing Machines on this principle are used in—

The Bank of France, The Bank of Rome, The Bank of St. Petersburg.—The Paper Mills of Firmin, Didot & Cie., du Marais, des Gorges, &c., &c.

HYDRAULIC TESTING MACHINE,
FOR PROVING THE STRENGTH OF BOTTLES.



HYDRAULIC TESTING MACHINERY.

MACHINE FOR PROVING THE STRENGTH OF BOTTLES.

The above Machine is both simple and complete. It consists of a suitable holder in which the bottle is securely held by the neck in such a way as not to apply any undue strain; while the mouthpiece is held against the mouth by a screw. The pressure is applied by means of a hydraulic "Compressor" or continuous pump, which acts without intermission and therefore causes no sudden shocks. It consists of a small vertical hydraulic cylinder, into which a plunger is forced by means of a finely pitched screw, thus displacing the water and applying the force required. At the bottom of the cylinder is placed a circular bath of mercury, covered by an india rubber diaphragm, and an accurately fitting cover, the mercury communicating by a pipe with an open column at the side. The cover is acted on by the pressure in the cylinder, and every increase of pressure displaces the mercury and causes it to rise in the column. This means of measurement is very delicate and exact.

Price of the Machine to test from 15 to 600 lbs. per square inch ...	£13 10 0

INDEX.

A

PAGE

"Accumulator" for Power 91, 92, 93

"Accumulator," Steam Pump 50, 88 to 90

Almonds, Press for extracting Oil from 55, 56

Armstrong Hoists 75

B

Bales, Sizes of 8

Baling Presses ... 9, 11, 12, 13, 15, 16, 17, 18, 23, 24, 25, 26, 33, 34

Baling, Tools used for 22

Banks, Hoists for ... ... 67 to 75

Bottle Testing Machine 111

Boiler Feeding Pumps 98, 99, 100

Bramah's Invention of Hydraulic Press 3, 6

"Bramah" Pattern Press Pumps 77, 78, 80

Brewers' Hop, Presses ... 49, 50

Bookbinders' Presses ... ... 27 to 30, 35, 36, 41, 61

C

Camels' Hair, Presses for Baling 9 to 12

Castor Seeds, Press for extracting Oil from 55, 56

Cider Presses 40

Chain Hoists ... ... 72 to 75

Chemical Purposes, Presses for 37 to 44

Circular Inches—Explanation... 7

Cocoa Nut Fibre, Bales of ... 8

Ditto Press for Baling 16

Cocoa Nut, Presses for extracting Oil from 51, 52

Compound Screw Presses 17, 18, 25, 26, 41, 42, 43, 44

Cotton, weight, &c., of 8

PAGE

Cotton Presses ... ... 9 to 21

Cotton Seed, Presses for extracting Oil from 57, 58

Cotton Wool, Presses for Baling 9 to 12

Cup Leathers 64

Cutting Gold and Silver, &c., Presses for 65

D

Description of parts of Hydraulic Press 5

Desgoffe's Compound Presses 41 to 44

Desgoffe's Pressure Gauge ... 96

"Differential" Accumulator ... 93

Differential Pressure Gauge ... 95

Docks, Hydraulic Pressure used at 7

Double Press Pumps 86

Dumping Presses 19, 20, 21

Dye Woods, Presses for Baling 11

E

Esparto Grass, Press for Baling 23, 24, 25, 26

Experimental purposes, Presses for 27 to 30, 35, 36, 41, 61, 65

Experimental purposes, Pump 80

F

Facts in connection with Hydraulic Presses 6

Flax, Presses for Baling 23, 24, 25, 26

Flax Seed, Press for extracting Oil from 57, 58

Floor Cloth, Press for Printing 63

Forcing Pumps 98, 99, 100

G

Gauges for Hydraulic Presses 94 to 97

Grass, Press for Baling Esparto 23, 24 25, 26

PAGE
Greaves, Press for extracting Tallow from 47, 48
Grapes, Presses for ... ... 37 to 44

H

Half-pressure explained 18
Hay, Presses for Baling ... 14 to 26
Hay, size of Bales 8
Hemp, Presses for Baling 23, 24, 25, 26
Hemp, sizes of Bales... 8
Hides, Presses for Baling... 33, 34
Hides, sizes of Bales... 8
Hoists, Hydraulic ... ... 66 to 75
Hotels, Lifts for... ... ... 66 to 75
Hot Press, for Stearine 52, 54
Hop Presses... ... ...21, 49, 50
Hydraulic Lifting Jacks 61, 62
Hydraulic Pressure Gauges 95 to 97
Hydraulic Pressure Pumps 76 to 90
Hydraulic Testing Machinery 94 to 112

I

India Rubber, Presses for Baling 9 to 12
Inverted Cylinder, Hydraulic Press with 31, 32

J

Jacks, Hydraulic Lifting... ...61, 62
Jute, size of Bales 8

L

Lard, Hydraulic Press for 51 to 54
Leathers for Hydraulic Presses 64
Leonard's Whipping Hoists 72 to 74
Lifting Jacks, Hydraulic 61, 62
Linen Yarn, Presses for Packing 9 to 12
Loose Materials, Presses for Baling of 9, 11, 12, 13, 15, 16, 17, 18, 26
Logwood, Presses for Baling 9 to 12

M

Machinery for Proving Pipes 101, 102
Machinery for Testing Strengths of Materials ... ... 103 to 112

N

Naylor's Pressure Gauge 95
New Zealand Flax, Presses for 23 to 26

O

Oil Mill Plant 57, 58
Oil Presses ...37 to 44. 51 to 60

P

PAGE
Olive Presses ... 51 to 54. 59, 60
Paper, Machine for Testing ... 110
Packing, Presses for ... ... 27 to 36
Pipe Proving Machinery ... 101, 102
Practical Notes 8
Presses, Screw 17, 18, 25, 26, 40 to 44, 63
Presses for Almonds 55, 56
" Baling 9 to 26. 33, 34
" Bookbinders 27 to 30, 35, 36, 41, 61
" Camels Hair ... 9 to 12
" Castor Seeds 55, 56
" Cider 40
" Chemical Purposes 37 to 44
" Cotton Seeds 57, 58
" Cotton ... ... 9 to 21
" Cotton Wool ... 9 to 12
" Dumping... ... 19, 20, 21
" Experimental Purposes 27 to 30, 35, 36, 41, 61, 65
" Esparto Grass... 23 to 26
" Flax Baling 26
" Flax Seeds 57, 58
" Grapes ... ... 37 to 44
" Greaves 47, 48
" Hay ... 13 to 21, 23 to 26
" Hemp ... ... 23 to 26
" Hides 33, 34
" Hops 19 to 21, 49, 50
" India Rubber ... 9 to 12
" Lard ... ... 51 to 54
" Linen Yarn ... 9 to 12
" Loose Materials 9 to 26
" Oil Extracting 37 to 43, 51 to 60
" Olives... 51 to 54, 59, 60
" Packing ... ... 27 to 36
" Paraffin ... ... 51 to 54
" Photographers & Printers' use 27 to 30, 35, 36, 41, 61
" Printing Floor Cloths 63
" Rags... ... .. 9 to 26
" Sheepskins ... 33 to 34
" Silk ... ... 9 to 12
" Stearine ... ... 51 to 54

Page
Presses for Straw ... ... 19 to 26
" Tallow ... 47, 48, 51, 54
" Tanners use 45, 46
" Tinctures... ... 37 to 44
" Tobacco ... .. 9 to 12
" Wool... ... ... 9 to 26
Photographers' and Printers' Presses 27 to 30, 35, 36, 41, 61
Power of our Presses, Note on 8
Press Leathers 64
Press Pumps ... ... 95 to 97
Pressures Employed 7
Pressure Gauges... ... .. 95 to 97
Principle of the Hydraulic Press 3
Proving Pumps ... 80, 98, 99, 100

R

Rail Testing Machinery ... 106, 107
Rags, Presses for Baling ... 9 to 26
Railway Stations, Hydraulic Hoists for... ... ... 66 to 75
Relation between Speed and Power of Presses 5

S

Screw Presses 17, 18, 25, 26, 41, 63
Sheepskins, Presses for Baling 33, 34
Silk, Presses for Baling ... 9 to 12
Sizes of various Bales 8
Speed and Power, relation between 5
Steam Pumps as Motor for Lifts, &c. 4, 66, 68

Page
Steam Pump as Accumulator 88, 89, 90
Stearine Presses ... ... 51 to 54
"Ster Hydraulic" Presses 41 to 44, 103 to 112
Straw Presses ... ... 19 to 26

T

Table of Weights for Hydraulic Lifts 70, 71
Tallow Presses ... 47, 48, 51 to 54
Tanners Bark, Press for 45, 46
Technical Terms for parts Hydraulic Presses 6
Testing Machinery ... ... 94 to 112
Testing Pumps 80, 98, 99, 100
Tobacco, Presses for packing 9 to 12
Treble Press Pumps 87
Tincture Presses... 37 to 44, 55, 56
Tools used for Baling 22
Thomasset's Testing Machinery 96, 103 to 112

W

Water Works, Main Pressures... 7
Weights Table for Hydraulic Lifts 70, 71
Whipping Hoists 72, 73, 74
Wire Testing Machinery 108
Wool, Presses for Baling ... 9 to 26
Wool, size of Bales 8

Y

Yarn (linen), Press for Packing 9 to 12

AT THE SAME ADDRESS MAY BE OBTAINED

HAYWARD TYLER & Co.'s
COMPLETE CATALOGUE
OF
PUMPS, BRASSWORK, & MACHINERY.

PART I.—
Containing Brass Work, Baths, Fittings, Closets and Sanitary Appliances,
Water-Works' Fittings, Garden Engines,
Fire Engines, House Pumps, Deep Well Pumps and Frames, and
General Pumping Machinery.
PRICE, IN PAPER COVERS, ONE SHILLING AND SIXPENCE.

PART II.
Steam Engines and Boilers, Steam Fittings, Engineers' Tools, &c., Turbines, Hydraulic Press Work.
PRICE, IN PAPER COVERS, ONE SHILLING.

PART III.—
Soda Water Machinery.
PRICE, IN PAPER COVERS, ONE SHILLING.

PART IV.—
Steam Pumps, for Deep Mines, Quarries, Fixed Fire Engines, Household Purposes, &c., &c.
PRICE ONE SHILLING.

ALSO PRICE BOOK OF
RIDER'S HOT AIR ENGINE, &c.

HAYWARD TYLER & Co., Engineers,
84 & 85 WHITECROSS STREET, LONDON, E.C.
(The Business Established 1815; since 1834 carried on by H. T. & Co.)

ECONOMY OF FUEL.

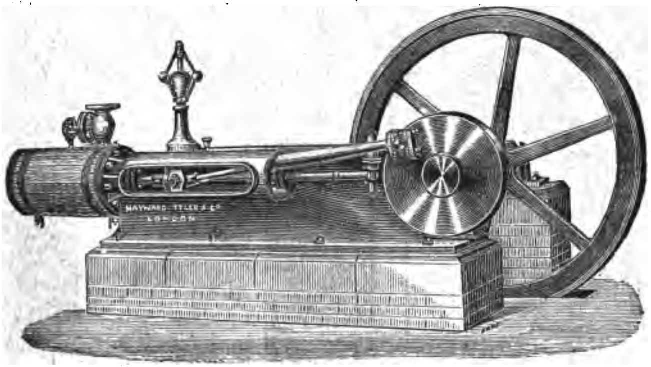
HAYWARD TYLER & Co.'s

IMPROVED

"RIDER PATTERN" HORIZONTAL STEAM ENGINES.

FITTED WITH

Rider's Patent AUTOMATIC VARIABLE EXPANSION GEAR, controlled by the Governor; securing EXTREME ECONOMY of STEAM CONSUMPTION, as well as REGULARITY of WORKING.



For full discussion of the advantages of this system, see "Notes on the Advantages of Using Steam Expansively in Steam Engines," by J. C. Fell, Memb. Inst. Mech. Engineers, &c., published by Messrs. Spon & Co. London. Also proceedings of the Institution of Mechanical Engineers, Bristol Meeting, 1877.

For description of the Engine see "Engineering," "Iron," &c.

These Engines are at work at a number of large Factories in different parts of the country, securing a saving of fuel amounting in some instances to 16 and 20 per cent. and even more.

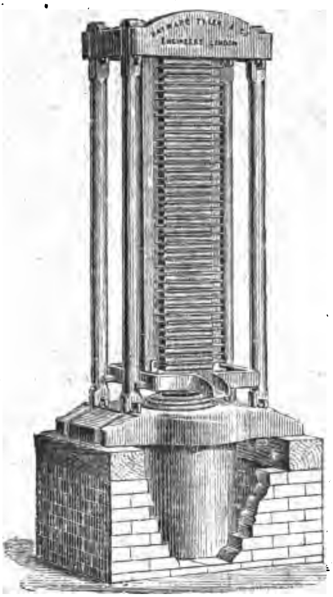
Among the Firms, Companies, and private Owners who are using this system of Expansive Gear may be mentioned the following well-known names:—

Messrs. Fox, Brothers, Tonedale Mills, Wellington, Somersetshire.
Messrs. Shaw & Co., Kilnap Mills, Cork (Compound Engine).
Messrs. Howards & Sons, City Mills, Stratford, E. (two Engines).
Messrs. Herrings & Co., Drug Mills, Aldersgate Street, E.C.
Messrs. White & Son, Confectionery Mills, and Mineral Water Works, Camberwell, London.
Messrs. Fry & Co., Soda Water Works, Brighton.
The Honble. J. Locke King, Weybridge, Surrey.
Howrah Jute Mills, Calcutta (Compound Condensing Engine).
Oude and Rohilkund Railway Company, Linn (three Engines).

To any of whom, as well as to various other Firms, Reference may be made.

FULL PARTICULARS CAN BE OBTAINED FROM

HAYWARD TYLER & Co., Engineers,
UPPER WHITECROSS STREET, LONDON, E.C.



PRICE 2S. 6D.

Entered at Stationers' Hall.